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The Role of the Federal Government in the Industrial Expansion of Utah During World War Two

Anthony Thomas Cluff

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THE ROLE OF THE FEDERAL GOVERNMENT IN THE INDUSTRIAL EXPANSION OF UTAH DURING WORLD WAR TWO

by

Anthony Thomas Cluff

A thesis submitted in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE
in
Economics

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PREFACE AND ACKNOWLEDGMENTS

The period in Utah's history from 1900 to 1942 was one of limited economic progress. Workers emigrated to more lucrative areas of the nation, the rate of growth in manufacturing declined, and there was a general fall in per capita personal and farm income. As a result of this decline, Utah suffered relatively more than most states in the nation during the 1930's.

World War II caused the industrial and technological development of Utah to mushroom. What the New Deal of the 1930's failed to bring in prosperity to the nation, was more than made up for by the vast amount of government spending during World War II. Such government spending was particularly important to the Utah economy. Long after the war, the effects of wartime government spending were still being felt in the state's economy. Today, remainders of wartime government investments, such as the Geneva Steel Works and the Utah Oil Refinery, employ thousands of Utahns, pay incomes to those thousands, and purchase great amounts of Utah's natural resources each year.

The objectives of this study have been the following:

1. A brief study of the national expansion of industry during World War II.

2. A statistical and institutional description of the
various government wartime defense plants built in the state.

3. A comparison of national and Mountain States with Utah industry before and after the war.

4. A study of the effects of both the government activities and the war on the state's industry.

The most important sources of information for this study included the Salt Lake Tribune, The New York Times and various periodical publications, all of which were found at the library at Utah State University. In addition, various governmental publications, especially from the U.S. Department of Interior, U.S. Department of Commerce, U.S. Civilian Production Administration, and the Utah Industrial Commission, were invaluable. The archives at the Utah State Historical Society held a treasure of valuable letters and telegrams written during the war by individuals in key positions in both the state and national governments. Use was also made of the files of the Department of Employment Security and the University of Utah's Department of Economics and Business, both of which are located in Salt Lake City.

The author would like to thank and acknowledge certain institutions and individuals who made this study possible. Appreciation is extended to the librarians and workers at the library at Utah State University whose time and effort spent searching shelves and indexes for
information is greatly appreciated. Thanks also goes to the librarians at the Utah State Historical Society, whose interest in my subject and patience with my questions was remarkable.

Several individuals have been instrumental in the completion of this work. Appreciation is extended to professors E. B. Murray and V. L. Israelsen both of which, as economists, have been an inspiration to my continued study of economics at Utah State. Professor S. G. Ellsworth, in his capacity as a historian, has provided stimulus for attempts at accuracy of dates and authenticity of events. Special thanks is in order to professor L. J. Arrington whose inspiration as an instructor and patience over comma splices has been exceptional. Dr. Arrington's suggestions concerning this work have been highly valued and enthusiastically incorporated.

Finally, thanks go to my parents and my wife's parents, whose financial and moral support have been greatly appreciated. Grateful appreciation goes also to my wife, who, though surprised and pleased at the completion of this work, has given encouragement and hope during hours of despair.
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CHAPTER I

NATIONAL INDUSTRIAL EXPANSION, 1939-1945

From Depression to Boom

For ten years the American economy had been depressed. Unemployment haunted economic planners, low production plagued manufacturers, low incomes impoverished wage earners, and everyone hoped for the dawn of new prosperity. It was as if recovery had waited for an untrodden decade to arrive before heralding the new day. The New Deal brought Social Security for old age, insurance for bank deposits, new guarantees for labor, and a score of public work projects, but it did not bring economic recovery.

The year 1937 had seen some resemblance of an upswing, but "business crossed the street from 1938 to 1939, slipped on a banana peel on the opposite curb, and nearly landed on its ear."¹ Though the New Deal had promised both recovery and reform, it accomplished the reformation but failed to enliven economic stimulation. As late as 1939, unemployment was still a serious problem. Estimates of the number of unemployed totaled approximately 10,000,000 at the close of 1939. Industrial production and real income, both on a

¹"A. D. 1939," Fortune, January, 1940, p. 98.
per capita basis, were still considerably below 1929 since there had been an increase of nearly 10,000,000 persons to the population during the decade.\textsuperscript{2}

Recovery came with war in Europe. Though most Americans desired to remain aloof from the European problem, economically they were drawn into the conflict. With the choosing of sides, America committed itself to the aid of England and France, and when Neville Chamberlain sat down at a microphone in London in 1939 and said, "I have to tell you now that this country is at war with Germany,"\textsuperscript{3} America's idle capacity was tapped for wartime production. The American businessman understood that

as the U. S. grew richer from the war, as men went back to work, as payrolls rose, as goods moved from railheads and docks, the country in spite of itself acquired a vested interest in the catastrophe abroad.\textsuperscript{4}

Even though business was in a moderately rising phase before the war in Europe started, when the European conflict became a reality at the beginning of September its repercussions on domestic business were anything but depressive.


\textsuperscript{3}"A. D. 1939," \textit{Fortune}, p. 98.

\textsuperscript{4}\textit{Ibid.}
It changed the moderate recovery into a sharp and vigorous expansion that in its early stages had the characteristics of a speculative boom. A forward buying movement developed immediately and was followed by a rise in purchasing of producer's goods that pushed production forward at a spectacular rate. By December, industrial production on an adjusted basis was the highest on record.5

As the increased production put idle machinery, men and plants back to work, attention was drawn to depreciated facilities. It appeared that so long as incomes remained low and capacities ample to meet current needs, there was little incentive to increase equipment installations, but "when increased needs were anticipated and brought prospects of rising prices, there was a rush to carry out plans for improving productive facilities."6

The aircraft manufacturing industry had expanded to a record level by reason of large government and foreign orders for military planes. The shipbuilding industry was bolstered by the acceleration of programs by the Maritime Commission, and at the year end, total tonnage under construction in American shipyards was the highest since 1920.7

President Franklin D. Roosevelt, as with Lincoln changing generals, experienced trouble in finding a board

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5 Survey of Current Business, February, 1940, p. 3.
6 Ibid., p. 10.
7 Ibid.
or commission to coordinate industrial mobilization. In May of 1940, the President, in an address to the American people concerning his program for national defense, stated:

Yes, we are calling upon the resources, the efficiency and the ingenuity of American manufacturers of war material of all kinds of airplanes and tanks and guns and ships and all the hundreds of products that go into this material. The government of the United States itself manufactures few of the implements of war. Private industry will continue to be the source of most of this material; and private industry will have to be speeded up to produce it at the rate and efficiency called for by the needs of the times. 8

Inspired by the success of Bernard Baruch during World War I, the President attempted no fewer than four major agencies before finally settling on one. The War Resources Board was set up in August of 1939, but failed to live to see the new year in. The National Defense Advisory Commission to the Council of National Defense was organized in the middle of 1940 and managed to exist until January of the following year. Coordination in 1941 was under the direction of both the Office of Production Management, which was organized January 1941, and the Supply Priorities and Allocations Board, which was organized in August of 1941. Both existed until January of 1942, when the President organized

the War Production Board. It was under the National
Defense Advisory Commission and the Office of Produc-
tion Management that new plant construction had its
beginning, but most of the expansion came under the
auspices of the War Production Board. The organization
of the remainder of the chapter follows somewhat the
pattern found in *Industrial Mobilization for War*, which
is the official history of the War Production Board.9

The National Defense Advisory Commission
(1940-1941)

The subsidizing of individuals carried on by the
federal government during the 1930's was continued into the
1940's, only it was done for the sake of war. In 1940,
*Fortune* magazine stated that:

> What the American people might be unwilling to
> pay out for leaf raking, dams, and new country
> roads they are willing and will have to be will-
> ing to pay for battleships. What has happened
to the budget might be compared to what happened
to the lady of light reputation who gets married.
Her habits do not change. The ring on her
finger makes all the difference.10

9 U. S. Civilian Production Administration, Bureau of
Demobilization, *Industrial Mobilization for War: History
of the War Production Board and Predecessor Agencies*, 1947,
pp. xiii-xiv.

10 "U. S. Defense: The Dollars," *Fortune*, November,
1940, p. 79.
The lack of facilities

Although some expansion had taken place in 1939, major expansion of plant capacity began in 1940. With both the French and English forces to supply, in addition to equipping America's own expanding armed forces, idle capacity soon disappeared and an effort was made to increase plant capacity for future production. In 1940, President Roosevelt spoke of producing no less than 50,000 planes per year, and newly expanded facilities were estimated to be inadequate in meeting such high goals.

Fortune magazine noted that:

It takes six to ten months to construct a powder plant which means we have been none too early in commissioning the du Ponts to build one for us in Indiana as they are building one for Great Britain in Tennessee. Nor... have we been any too vigorous in establishing the means to make torpedoes. Up to a year ago our torpedo-manufacturing capacity was around one a day.11

There was at the time "no company in the U. S. . . . ready--short of months of herculean and costly preparation --to go into production on a major order of artillery."12

It was noted also that:

Within industry many corporations, remembering the searing aftermath of the last war--workers dismissed by the thousands, plants shut down,


12"The Best Bargain We Can Jolly Well Make," Fortune, April, 1940, p. 68.
expensive equipment standing idle, and realizing much smaller profits will be made from this one— are saying, and have so informed the Defense Commission, that they would rather not take defense orders, so long as other suppliers, desperate for business, are available.\textsuperscript{13}

Manufacturers were further reluctant to undertake defense contracts in light of the Vinson-Trammel Act, which had been passed in April of 1939. The Act placed a ceiling on military and naval contracts and subcontracts to limit profits in the aircraft industry.\textsuperscript{14}

In the President's address made in May of 1940, the part that the government was to play in the development was clearly stated. The President said:

I know that private business cannot be expected to make all of the capital investment required for expansions of plants and factories and personnel which this program calls for at once. It would be unfair to expect industrial corporations or their investors to do this, when there is a chance that a change in international affairs may stop or curtail orders a year or two hence.

Therefore, the Government of the United States stands ready to advance the necessary money to help provide for the enlargement of factories, the establishment of new plants, the employment of thousands of necessary workers, the development of new sources of supply for hundreds of raw materials required, the development of quick mass transportation of supplies. And the details of this are now being worked out in Washington, day and night.\textsuperscript{15}

\textsuperscript{14}\textit{Industrial Mobilization for War}, p. 25.
The Commission's responsibility

Although the Advisory Commission had no responsibility for financing defense facilities, it received authority to determine what facilities to build. The Advisory Commission recommended that there be a distinction between facilities that would be worthless after the conflict and those which would have some peacetime value. For the plants which would have some peacetime value, the Advisory Commission worked out a series of devices to bring private capital into the defense program. For the "worthless" facilities, the Emergency Plant Facilities Contract was created. Under this contract, the manufacturer would attempt to raise the money for the new plant and equipment with the guarantee that the government would reimburse him over a five year period.\footnote{\textit{Industrial Mobilization for War}, p. 25; \textit{"The War Goes to Mr. Jesse Jones," Fortune}, December, 1940, p. 188.}

The Defense Plant Corporation

The Reconstruction Finance Corporation was experimenting with what was to become the Defense-Plant-Corporation method of government financing. Defense Plant Corporation would shoulder the cost of erecting plants for manufacturing. Typically, the War Department or Navy would pay the Defense Plant Corporation a portion of the cost out of current
appropriations promising to reimburse the Corporation out of future appropriations for any final debt. At that point the government would own the plant unless the manufacturer exercised an option to purchase the new facilities.\textsuperscript{17}

The Defense Plant Corporation was organized on August 22, 1940, under authority of section 5(d) of the Reconstruction Finance Corporation Act as amended. Acting as a subsidiary of the Reconstruction Finance Corporation, the Defense Plant Corporation was created to aid in the national defense program by financing and supervising the construction and equipping of industrial facilities. Under the provisions of its charter the Defense Plant Corporation could undertake to construct and equip facilities on its own authority. Most construction, however, came only upon recommendation and sponsorship of another agency concerned with defense production. Although the Defense Plant Corporation did not finance the construction of all government built plants, it did contribute approximately $9,000,000,000 for the construction of 2,265 plants in almost every type of manufacturing industry in the nation.\textsuperscript{18}

\textsuperscript{17}Ibid.

Accomplishments of the Advisory Commission

Whatever its shortcomings as an organization, the Advisory Commission . . . did succeed, perhaps beyond any reasonable expectation, in what was from the long-range point of view the most important of its tasks. With only the convictions, the personal prestige, and the industrial contacts of its members for authority, the Commission played the major role in launching a $9 billion facilities expansion.19

Authorizations. During the Commission's existence, a total of $1,600,000,000 was authorized for direct military construction,20 while $3,700,000,000 was earmarked for expansion of industry and industrial services. More than 60 per cent of the industrial expansion authorized in the last half of 1940 was to be financed privately.21

The largest authorization was for expansion of aircraft facilities, for which $516,000,000 was set aside. Of this total, $50,000,000 was to be financed privately. Next to aircraft the greatest expansion was for explosives

19 Industrial Mobilization for War, pp. 77-78.

20 The term "authorization" represents commitments to both construct and equip facilities and the allocation of funds for that purpose.

21 Industrial Mobilization for War, pp. 77-78.
and ammunition loading, which totaled $485,000,000, while guns and ammunition amounted to $274,000,000. A relatively small but important item was the investment of $34,000,000 for expansion in building machine tools and other metal working equipment.22

Construction. By the end of 1940 about $810,000,000 of new industrial plants had been constructed,23 with public construction accounting for $159,000,000, or about 20 per cent of the total for the years 1939 and 1940, while private construction amounted to $651,000,000 during the 1939-40 period.24

Facilities for aircraft production grew substantially under the Advisory Commission. In January, 1940, the major airframe companies occupied 7,335,000 square feet of floor space and employed 45,000 workers. In December, the floor space occupied was just under 11,000,000 square feet, and the number of workers had increased to 95,831.25

22 Ibid., pp. 79-80.

23 The term "construction" represents only the cost of the erection of new plants and not the equipping of facilities.

24 U. S. War Production Board, Wartime Production Achievements and the Reconversion Outlook, October 9, 1945, p. 33.

25 Industrial Mobilization for War, pp. 79-80.
Production. Total industrial production in 1940 was larger than in any previous year of U. S. history. The Federal Reserve Index of industrial production (using 1935-39 as 100), averaged 122 for the year. This was 8 per cent higher than the 1937 average and 11 per cent above that for 1929, which was regarded up to that time as the high-water mark of business activity in the United States. Largest increases were in aircraft, tin, zinc, steel, and pulp and paper, all of which were strongly influenced by war developments. Shipbuilding was greatly accelerated during the period. During 1940, 53 merchant ocean-going vessels of more than 2,000 gross tons each, representing a total of 444,700 gross tons, were completed in United States shipyards. This compares with 28 vessels and 241,000 gross tons in 1939.

Even with this substantial beginning of industrial facilities expansion, it was noted that:

Further expansion of industrial production is likely to proceed at a slower pace in the months ahead because the output of many firms is already pressing upon capacity. The situation is well illustrated by the present statistical position of the steel industry. Steel production over the past months has been above

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26 The period 1935-39 is used as a base for all indexes in this chapter.

96 percent of capacity—a record level in terms of tons produced. New Orders have been well in excess of shipments, and backlogs of unfilled orders are high and rising steadily.  

The Office of Production Management (1941-1942)

Expansion for 1941 was under the auspices of the Office of Production Management—the third workhorse of Roosevelt’s wartime machinery. The construction program of the Office of Production Management was largely a continuation and extension of the program started under the National Defense Advisory Commission, though the emphasis shifted from private to public financing. Under the Office of Production Management the Defense Plant Corporation began to play a dominant role in the expansion. Out of the $4,700,000,000 budget for the Reconstruction Finance Corporation in 1941, $2,500,000,000 was allocated to the Defense Plant Corporation.  

Accomplishments of the Office of Production Management

Authorizations. Altogether, a facilities expansion program totaling more than $16,000,000,000 was authorized in 1941, with direct military construction accounting for

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28 Ibid., December, 1940, p. 6.

29 Industrial Mobilization for War, p. 160; "The War Goes to Mr. Jesse Jones," Fortune, p. 204.
$2,700,000,000, industrial services for $2,600,000,000, housing for $3,600,000,000, and manufacturing, including petroleum extraction and mining, for more than $7,500,000,000. The largest single item in the expansion program was for explosives and ammunition loading costing $965,000,000, with iron and steel next at $925,000,000. Plants for producing guns and ammunition totaled $825,000,000; ships, $817,000,000; petroleum extraction and mining, $795,000,000; other chemicals exclusive of petroleum and synthetic rubber, $588,000,000; and aircraft, $544,000,000.\textsuperscript{30}

Construction. By the end of 1941, $2,800,000,000 worth of new industrial facilities had been constructed, with $2,000,000,000 of the additions coming in 1941 alone. Of this total, public financing amounted to $1,500,000,000, or about 53 percent of the total, while private funds totaled $1,300,000,000.\textsuperscript{31}

Production. Output of planes averaged more than 1,500 per month compared with the 500 units per month in the preceding year. The Federal Reserve Index of shipbuilding production advanced to 736 in December 1941,\textsuperscript{30,31}

\textsuperscript{30} \textit{Industrial Mobilization for War}, p. 161.

\textsuperscript{31} \textit{Wartime Production Achievements and the Reconversion Outlook}, p. 33.
from 236 a year earlier. Creation of new industrial facilities required unprecedented amounts of machinery and related equipment, total expenditures for which were estimated to have been close to half again as large as the 1940 total. Activity in the various industries comprising the machinery group showed a sharp increase, the index averaging 209 in 1941, a 55 percent advance over 1940's 135.32

The attack on Pearl Harbor in December of 1941 caused an upward revision of all schedules in preparation for a maximum military effort. At the year end, the President stated that the country must be prepared to devote 50 percent of its income to the prosecution of war, and the budget submitted to Congress called for an arms expenditure of over $56,000,000,000 in the fiscal year 1943. The peak of plant expansion was yet to come in the year 1942 under the direction of the final war bureau—the War Production Board.33

The War Production Board (1942-1945)

Responsibility of the War Production Board

Mobilization was organized for efficiency under the War Production Board. As for industrial expansion, the


33 Ibid., p. 4.
Board was to direct the provision of facilities for raw materials, equipment, tools and services, expand facilities required, curtail use of scarce resources and eliminate nonessential construction. The Board was also given the responsibility for distribution of materials and equipment.\textsuperscript{34}

On the industrial front, the Board broke through most of the intricate technical and administrative barriers preventing mobilization of industrial resources. A substantial amount of facilities had been constructed but the peak of production was still a year away and industrial facilities were still not adequate. The Production Division of the War Production Board was assigned the task of authorizing the construction of military and industrial facilities. To convert existing plants for war purposes the Division of Industry Operations was created.\textsuperscript{35}

An all-out effort for new construction often ran up against barriers as were encountered in the steel industry. Expansion of steel capacity met considerable opposition since construction of these facilities consumed large quantities of steel needed in munitions production. In addition, there was a shortage of pig iron for steel

\textsuperscript{34}Industrial Mobilization for War, p. 398.
\textsuperscript{35}Ibid., pp. 204-205, 240-241.
fabrication. At the end of 1942, plants for iron and steel products constituted over one-half of all deferred projects.36

The War Production Board attempted to eliminate nonessential construction by the issuance of Limitation Order L-41. This order, as amended later in 1942, prohibited the beginning of any construction costing more than $200 for residential buildings, $1,000 for farm construction, and $5,000 for industrial construction without specific approval from the Board.37

The Smaller War Plants Corporation

By 1942, smaller war plants were making substantial contributions to the war effort.38 Three-fifths of all smaller plants in 1942 were producing at least some war goods, and 40 percent of their combined output could be classified as war production. Though the smaller plants were making some contribution, they were faced with serious problems. Their total physical output was still at the 1941 level, and plants of the smallest size (0-7

37 Wartime Production Achievements and the Reconversion Outlook, pp. 32-33.
38 A smaller war plant is defined by the Survey of Current Business as one which hired less than 125 wage earners.
wage earners), taken together, had suffered an actual decline in output during the first of the war years. 39

With respect to the trend of production, it was found that the physical output of all the smaller firms had remained about constant during the period from January 1941 to January 1943, whereas industry as a whole had experienced a marked expansion. With respect to war production, it was found that 58 percent of the firms were producing at least some war goods, that war products comprised about 40 percent of the combined output of all smaller plants, and that the extent of participation in war production was greater among larger firms than among the smaller. 40

The Smaller War Plants Corporation was created in 1942 with passage of the Small Business Act of 1942. Its purpose was to assist in mobilizing the production facilities of small business for war production. It was empowered to make loans, to purchase and lease production facilities to small concerns and to contract with the government to furnish war materials and equipment. 41

Under the same Act, the Smaller War Plants Division of the War Production Board was created. At the end of


40 Ibid., p. 24.

1942, it was reported that the Division had been responsible for the direct placement of prime contracts totaling $102,100,000 with 3,274 firms. Altogether, the Division claimed credit for $1,000,000,000 worth of contracts to small business during the war.42

Accomplishments of the Board's first year

Authorizations. The composition of the facilities reflected the emphasis on meeting the huge demands for munitions and military equipment. The plants built in 1942 provided the unprecedented production of munitions and military equipment in later war years. Nearly two-thirds of all industrial facilities authorized in 1942 were for munitions production, including aircraft and ships.43

Construction. In 1942, a total of $3,800,000,000 worth of new industrial facilities was constructed. If equipping of these facilities is added, the total value put in place in 1942 was $8,400,000,000, with federal funds accounting for $6,400,000,000 of this figure. At the end of 1942, total industrial construction since 1939 amounted to $6,600,000,000, with the government paying for about 75 percent of the total.44

42 Industrial Mobilization for War, p. 530.
43 Ibid., p. 408.
44 Wartime Production Achievements and the Reconversion Outlook, p. 33.
It is estimated, however, that by November 30, 1942, only every fourth plant on which a war contract had been let since the middle of 1940 had been completed. Although some of the unfinished plants started partial operation, most of the new construction and equipment went into plants which were not yet producing munitions by the end of the year. Completion of facilities for war production averaged two to three months behind schedule, while the backlog of unfilled orders for machine tools, based on the annual rate in the fourth quarter, was equivalent to almost eight months production.\textsuperscript{45}

**Production.** Industrial production, measured by the Federal Reserve Index, was 180 in 1942 as compared with 156 in 1941. The amount of industrial production devoted to the war effort also changed over the same period. In 1941, approximately 18 per cent of the total production was for the war, but by 1942 approximately 55 percent of the total was war production.\textsuperscript{46}

Among the durable-goods manufacturing industries, the transportation-equipment group, including the vital shipbuilding and aircraft industries, recorded gains amounting to nearly 80 percent over 1941. Total 1942 aircraft production was over 48,000 plants of all types.\textsuperscript{47}

\textsuperscript{45} Industrial Mobilization for War, pp. 407-408.

\textsuperscript{46} Survey of Current Business, January, 1943, p. 10.

\textsuperscript{47} Ibid., p. 9.
Employment. The unemployment and employment figures for 1942 are of some significance. The total number of civilians employed in 1942 was estimated to be 51,900,000, while unemployment reached the low of 2,600,000—a smaller number of unemployed than the 2,900,000 registered in 1929, although the total labor force had grown by approximately 9,000,000 persons.48

Accomplishments of the Board in 1943

Construction. In 1943, the nation put the finishing touches on the most ambitious program of new construction ever undertaken in building a war machine. Most of the groundwork had been completed in 1942, and had been done with such rapidity that by the end of the third quarter of 1942 men and materials were being shifted from the preparation directly into the implementation of war materials.49

Industrial construction in 1943 totaled $2,200,000,000. By the end of 1943, $8,800,000,000 of new industrial facilities had been built, with public funds amounting to $7,000,000,000, or 80 percent of the total.50

48 Ibid., April, 1943, p. 10.
49 Ibid., April, 1943, p. 10.
50 Wartime Production Achievements and the Reconversion Outlook, p. 33.
While the decline in industrial construction over the year was perhaps the outstanding development in this field of activity, it must not be forgotten that the additions to the industrial facilities in 1943 were still of considerable magnitude. Even if allowance is made for the higher construction costs in 1943, it is evident that the physical facilities of industry were substantially enlarged during the year.51

Defense Plant Corporation ownership. It was estimated in 1943 that the Defense Plant Corporation owned one-third to one-half of the national metal-manufacturing capacity. In addition, it was further estimated that it owned huge chunks of new raw material industries, a significant fraction of the steel industry, pipelines, bargelines and nearly all of the new facilities that had been built for the war up to that time. By the first quarter of 1943, 1,022 of the plant projects financed by the Defense Plant Corporation had come into actual operation. Total cost to the government of constructing and equipping these 1,022 plants was $4,300,000,000.52

The plants and facilities built exclusively by the War and Navy Departments were purely military producers and therefore not considered to be potential competition

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for private industry. The plants built by the Defense Plant Corporation, however, were a source of worry to industry because upon the solution of the problem of postwar disposition of these wide-range facilities revolved the "principle of private enterprise as against government control or socialism." 53

Production. The Federal Reserve Index of industrial production in December of 1943 was 248. The average for the year was 239, representing a gain of 20 percent over the previous year and 48 percent over 1941. The bulk of the gain in total production in 1943 occurred in the durable goods industries, which included the major war industries. 54

Aircraft production reached the unprecedented level of approximately 86,000 planes, compared with the 48,000 in 1942. Ship construction showed phenomenal gains also, from 8,000,000 dead weight tons in 1942 to approximately 19,000,000 dead weight tons in 1943. Increases were also shown in the machinery and nonferrous groups, but only modest advances were recorded in iron and steel. It was


estimated that of the total industrial production in 1943, about 66 percent was for the war. 55

Accomplishments of the period 1944-45.

The facilities program was nearly completed by 1944. At the year's end a decision was made to add further to the already expanded tire capacity.

It was an unfortunate time to undertake any sort of construction activity. Lumber was becoming increasingly scarce, construction labor had gone into lines of work more directly related to the productive war effort, machine tools were nearly all in place and operating elsewhere, and certain types of steel were themselves becoming critical. In fact, the steel load was rising so rapidly that there was doubt that requirements for it could be met without the addition of 25 or 30 thousand men to the labor force. 56

The basic aircraft and shipbuilding facilities programs were completed and the 100-octane gasoline facilities and the synthetic rubber factories were brought into operation. New and expanded facilities for heavy bombers, jet-propelled planes, heavy artillery and shells, mortars and improved types of combat vehicles and landing craft,

55 Ibid., pp. 4-6.

56 Industrial Mobilization for War, p. 777.
were required to meet military needs but were a relatively small part of the 1944 expenditures. 57

An important feature of the 1945 expansion was the shift in importance between publicly and privately financed activity. Publicly-financed construction had dominated construction activity in the preceding years. In fact, 80 percent of the total new construction in 1942 and 1943 was financed publicly. This trend was reversed in July of 1945, and by December the value of private construction was more than triple that of public construction. 58

Some expansion of government-sponsored industrial construction occurred in 1945 prior to VE-day, but by the end of the year this source of construction activity dwindled to a shadow of its former size. Public industrial construction, which averaged about 65 million dollars a month in the period August through December 1944, had been stepped up to an average of 75 million dollars in a month in the first quarter of 1945 in response to the military demands for additional capacity of selected items. Expenditures on this class of construction reached a peak of 80-85 million dollars in April and May. 59

VE-day was responsible for the issuing of immediate stop-work orders on new construction. By August, the value of public industrial construction had declined to


58 Ibid., February, 1946, p. 17.

59 Ibid.
$49,000,000. Cessation of hostilities with Japan resulted in additional cuts in the program, so that $20,000,000 was spent for plants in October and considerably less in December. 60

Summary of Industrial Expansion

The role that American industry played in winning the war is summarized somewhat in the following statement from Fortune magazine:

This isn't the war of the Spitfires and the Messerschmitts. This war is being fought by the Bullards that turn the cylinder barrels; by the heavy toggle presses that hunch down to shape the parts for a bomber wing. This is the war of the machines, of manpower, of the managers; it is fought in a multiplicity of tolerances as fine as 1/10,000 of an inch and finishes measured in millionths of an inch. These, finally, are the animate and inanimate resources of a great industrial power. 61

The increase in the nation's output, and especially in manufacturing enterprises, reflected the success of the nation in providing adequate plant capacity. Expansion of plant capacity was achieved by construction of new plants or expansion of existing ones. Between 1939 and 1945, the nation's over-all productive capacity was

60 Ibid.

increased about 50 percent. Total expansion amounted to $25,000,000,000, with construction of plants totaling $10,000,000,000 and equipping of these plants totaling $15,000,000,000. Two-thirds of this total was financed by the federal government. 62

The greatest growth in facilities came early in the war years. More than one-half of the total additions during the five years had been completed by 1942, and more than three-fourths by 1943. Table 1 shows yearly totals spent for industrial construction during the war.

Table 1. Public and private industrial construction in millions of dollars, 1939-1945

<table>
<thead>
<tr>
<th></th>
<th>1939</th>
<th>1940</th>
<th>1941</th>
<th>1942</th>
<th>1943</th>
<th>1944</th>
<th>1945</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>241</td>
<td>569</td>
<td>2028</td>
<td>3806</td>
<td>2198</td>
<td>982</td>
<td>1280</td>
</tr>
<tr>
<td>Public</td>
<td>14</td>
<td>145</td>
<td>1350</td>
<td>3485</td>
<td>1973</td>
<td>748</td>
<td>640</td>
</tr>
<tr>
<td>Private</td>
<td>227</td>
<td>424</td>
<td>678</td>
<td>321</td>
<td>225</td>
<td>234</td>
<td>640</td>
</tr>
</tbody>
</table>

Source: see footnote 62.

Actual industrial construction in the five years accounted for only one-fourth of the total construction during those same five years. Indeed, had it not been for direct military building, "total new construction in

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62 Industrial Mobilization for War, p. 964; Wartime Production Achievements and the Reconversion Outlook, p. 6.
the defense and war period would have averaged less than in the 20 years preceding the invasion of Poland.\textsuperscript{63}

The proportion of government-financed construction was heaviest in those areas where there was the least assurance of postwar absorption of the new facilities by the civilian economy. Of the more than $3,000,000,000 invested in the aircraft industry during the war, of which 89 percent was federal funds, a large part was in plants which were likely to be unusable in the postwar period. Private financing was heaviest in aviation gasoline, chemicals, coal, petroleum products, food processing, machinery and electrical equipment, and miscellaneous manufacturers with peacetime outlets.\textsuperscript{64}

The Defense Plant Corporation

The Defense Plant Corporation was dissolved in July, 1945. At the time of its dissolution, the Corporation held plants, facilities and other assets which had cost nearly $7,000,000,000. Defense Plant Corporation had spent nearly $9,000,000,000 in constructing 2,492 manufacturing and non-manufacturing facilities. Nearly $8,500,000,000

\textsuperscript{63}\textsuperscript{63} \textit{Ibid.}, p. 7.

\textsuperscript{64} \textit{Ibid.}, p. 35.
of this total went into manufacturing. The biggest area of expansion was in the construction of aircraft facilities, which cost over $3,200,000,000. Since government construction amounted to about two-thirds of the total, or about $16,000,000,000, Defense Plant Corporation had contributed over one-half of the federal funds. The rest was financed directly by such agencies as the Maritime Commission, the War Department, the Navy, and the Reconstruction Finance Corporation. Table 2 shows the distribution of the Defense Plant Corporation's funds to various industries.65

After the war the nation was equipped with the newest and finest facilities in the world. To the nation it meant that, once these facilities had been converted from war production to producing for the consumer, America's productive capacity would be more than adequate to meeting the future demand for consumer goods in the postwar period of prosperity. As will be seen, Utah played a substantial part in the national expansion of the productive facilities, and received its share of wartime factories.

Table 2. Number of manufacturing plants and amount authorized for various industries by the Defense Plant Corporation, August 1940-August 1946a

<table>
<thead>
<tr>
<th>Industry</th>
<th>Number of Plants</th>
<th>Amount authorized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft</td>
<td>623</td>
<td>$3,207,328,000</td>
</tr>
<tr>
<td>Aluminum and magnesium</td>
<td>152</td>
<td>1,291,884,000</td>
</tr>
<tr>
<td>Aviation gasoline</td>
<td>45</td>
<td>324,142,000</td>
</tr>
<tr>
<td>Chemicals</td>
<td>199</td>
<td>214,038,000</td>
</tr>
<tr>
<td>Machine tools</td>
<td>166</td>
<td>90,939,000</td>
</tr>
<tr>
<td>Minerals</td>
<td>79</td>
<td>178,869,000</td>
</tr>
<tr>
<td>Ordnance</td>
<td>120</td>
<td>495,778,000</td>
</tr>
<tr>
<td>Radio and Communications</td>
<td>167</td>
<td>119,599,000</td>
</tr>
<tr>
<td>Shipbuilding</td>
<td>100</td>
<td>200,827,000</td>
</tr>
<tr>
<td>Steel and iron</td>
<td>225</td>
<td>1,147,780,000</td>
</tr>
<tr>
<td>Synthetic rubber</td>
<td>159</td>
<td>1,055,936,000</td>
</tr>
<tr>
<td>Other</td>
<td>230</td>
<td>143,694,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,265</strong></td>
<td><strong>8,470,822,000</strong></td>
</tr>
</tbody>
</table>


Source: see footnote 65, above.
CHAPTER II

WARTIME INDUSTRIAL EXPANSION IN UTAH

Comparison of Utah and the Nation

The federal government, in allocating new facilities throughout the country, was continually plagued with the problem of urgency in building new plants while at the same time attempting to evenly disseminate them. No matter how idealistic the planners might have been in the dispersion of facilities, in reality the natural thing to do was to expand plants already existing in heavily industrialized areas. These areas offered large numbers of unemployed factory workers, developed transportation systems, and plants which could be expanded more hastily than completely new facilities could be built. The nonindustrialized areas were composed of rural workers who had little knowledge of working in a factory, and had few existing plants which could be expanded. Since these areas lacked any existing industrial factories, they failed to receive large amounts of the new industrial facilities.

In a hearing before the House Committee on Military Affairs in 1941, the following colloquy, which took place between Representative Kilday of Texas, and William Knudsen, then director of the Office of Production
Management, exemplifies some of the problems faced by government officials:

Mr. Kilday. Mr. Knudsen, in the early days I believe that the National Defense Advisory Commission issued a policy with reference to the location of newly-established defense industries, and there were a number of considerations in the policy with reference to the availability of labor, and so on, and as to the locality, to the effect that they should be placed strategically, from a defense standpoint.

Mr. Knudsen. Yes.

Mr. Kilday. And that included the territory between the Alleghenies and the Rockies, and far enough from the borders and the coast?

Mr. Knudsen. 200 miles.

Mr. Kilday. Have you pretty generally adhered to that?

Mr. Knudsen. Yes, sir. Of course, you must understand that we have expanded some plants, but they were outside the line because we could not move them away from there.\(^1\)

According to Mr. Knudsen's testimony, both the National Defense Advisory Commission and the Office of Production Management had attempted to disperse new expansion, while at the same time placing facilities strategically, both for defense purposes and for a means

of rapid production. Mr. Knudsen added that:

This matter of plant locations, of course, is quite a ticklish subject whenever we have them to place. But we have no brief for any particular place in the United States. We began in the O.P.M. to try to do it as fairly as we knew how. We have not any particular pet location in the United States.2

After the war, however, the War Production Board admitted that the geographical pattern of industry was not greatly different from what it was before the war. It further stated that industrially, "the top nine states of 1939 are the top nine today."3

The largest part of the increase had gone to the East-North Central states. This region had 31.5 percent of the nation's facilities in 1939, and received 26.9 percent of the new facilities during the war. The Middle Atlantic states, which had 29.8 percent of the 1939 facilities, received 15.7 percent of the expanded total. The smallest amount went to the Mountain states, which received only 3.26 percent.4 Although the

2Ibid.

3U. S. War Production Board, Wartime Production Achievements and the Reconversion Outlook, October 9, 1945, p. 33.

4Ibid. This reference states that the percentage received in the Mountain states was 5.26 percent, which appears to be an error, since the region received $818,000,000 out of the $25,000,000,000 spent.
Mountain states received the smallest amount of expansion, this area had a great percentage increase in facilities. The Mountain states increased the value of their productive facilities by 188 percent, while the value in the East-North Central states was increased by 54 percent. Table 3 shows the national distribution of industrial facilities in 1939 and during the war.

Table 3. Regional comparison of United States industrial facilities in 1939 and industrial facilities built during the period 1940-45 (in millions of dollars)

<table>
<thead>
<tr>
<th>Region</th>
<th>1939 value</th>
<th>1939 percent</th>
<th>1940-45 addition</th>
<th>Percent- age of addition</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England</td>
<td>3,877</td>
<td>9.8</td>
<td>1,101</td>
<td>4.38</td>
</tr>
<tr>
<td>Middle Atlantic</td>
<td>11,788</td>
<td>29.8</td>
<td>3,941</td>
<td>15.66</td>
</tr>
<tr>
<td>East-North Central</td>
<td>12,461</td>
<td>31.5</td>
<td>6,773</td>
<td>26.92</td>
</tr>
<tr>
<td>West-North Central</td>
<td>2,176</td>
<td>5.5</td>
<td>1,688</td>
<td>6.71</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>3,600</td>
<td>9.1</td>
<td>1,551</td>
<td>6.16</td>
</tr>
<tr>
<td>East-South Central</td>
<td>1,345</td>
<td>3.4</td>
<td>1,248</td>
<td>4.96</td>
</tr>
<tr>
<td>West-South Central</td>
<td>1,305</td>
<td>3.3</td>
<td>2,544</td>
<td>10.11</td>
</tr>
<tr>
<td>Mountain</td>
<td>435</td>
<td>1.1</td>
<td>818</td>
<td>3.26</td>
</tr>
<tr>
<td>Pacific</td>
<td>2,571</td>
<td>6.5</td>
<td>1,938</td>
<td>7.70</td>
</tr>
<tr>
<td>Undistributed</td>
<td>--</td>
<td>--</td>
<td>3,556</td>
<td>14.14</td>
</tr>
<tr>
<td>Total</td>
<td>39,558</td>
<td>100.0</td>
<td>25,158</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: see footnote 4, above.

5 Ibid., p. 36.
Utah received authorizations for a total of over $311,000,000 of new facilities during the war, or about 38 percent of the total amount authorized for the Mountain states. Of this amount, about $27,000,000 was financed privately, while over $284,000,000 was financed publicly.\(^6\) Table 7 (see Appendix A, p. 186), list the industrial facilities authorized for the state of Utah during the war.

On a per capita basis, if the $25,000,000,000 spent for new facilities during the period 1940-45 is distributed over the average population of 133,000,000 for those same years,\(^7\) there was approximately $188 spent per person nationally. In Utah, the amount spent per person was much higher. Utah's average population for the years 1940-45 was 583,000.\(^8\) By distributing the $311,000,000 authorized for Utah, there was a total of $534 per person in the state. Furthermore, there was a

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\(^6\) U. S. Civilian Production Administration, War Industrial Facilities Authorized, July 1940 to August 1945, pages not numbered. The listing of plants in this document omits plants with expansions falling between $25,000 and $50,000. Public authorizations omitted represent a negligible fraction of 1 percent of total public expenditures, and private authorizations omitted came to less than 3 percent of the total.


total of $428 in public funds spent per person in Utah, while only $120 in public funds was spent per person nationally.

Early Expansion in Utah

Probably the first event to create interest in Utah, especially among West Coasters, was the moving of the Army's bombing base in September of 1940 from San Francisco to Salt Lake City. The objective was to place it where the possibility of enemy attack would be minimized and yet keep it within easy flying distance of the area it was to protect.9

It was noted that the Beehive state's leaders traditionally had " frowned on encouraging new industries and branch plants because of their doubts about the type of population that might be attracted."10 But it was pointed out that the newly-elected Democratic Governor, Herbert B. Maw, was pushing strongly for industrial development, as exemplified in his move for the establishment of the state's first Department of Publicity and Industrial Development. Commenting on Utah's promotional move, Business Week stated:

10 Ibid.
A strong bid for chemical and electro-chemical industries is a part of the governor's program and the state's supplies of such materials as sulphur, gypsum, helium, and carbon dioxide, radium, uranium, vanadium, phosphate rock, alunite, and, of course, potash will be featured.

To emphasize Utah's strategic location for defense industries, promotion will point out that the War Department, in addition to moving the former San Francisco bombing base to Salt Lake City, has located the principal western Air Corps repair depot at Hill Field between Salt Lake City and Ogden, and a major Quartermaster Supply Depot together with a new Ordnance Depot near Ogden.11

The Ogden Arsenal

Shortly after World War I, the United States Army constructed an arsenal near Ogden. The plant was to provide storage for surplus equipment away from large population centers. The plant remained small and unimportant until 1936 when it was enlarged to include a bomb-loading plant. In 1940, another program of expansion was started by enlarging storage facilities and adding several manufacturing units to assemble 20 and 37-millimeter shells.12

This installation was of significance to Utah during the


12 Utah Department of Publicity and Industrial Development, Wartime Economic Changes and Postwar Industrial Readjustment in Utah, by J. R. Mahoney (Salt Lake City, 1943), p. 75.
war, since it was the first manufacturing concern to be built in the state during the period 1940-45.

The first expansion during the war was for a 37-millimeter shell loading plant during the last half of 1940. The plant was to cost $2,600,000, and was located on 973 acres of land north of the existing ordnance depot area. It was believed at the time that approximately 2,000 persons, mostly women, would be required at the new plant. 13

In June of 1941, a contract for additional construction of shell loading facilities amounting to $3,500,000 was announced by the Army. It was reported that the additional shell loading line would consist of 72 buildings and numerous utilities as compared with 105 buildings in the already existing shell loading plant. This additional construction brought the total authorization to $6,100,000. Production started at the plant in November of 1941 with 100 men and 40 women. Not only did the initiation of production require the usual increase in employment of women for clerical help, but the females were used in the assembly line also. 14

13 Salt Lake Tribune, December 20, 1940, p. 12; April 20, 1941, p. 14A.

14 Ibid., June 15, 1941, p. 13A; November 11, 1941, p. 11.
The Ogden Arsenal provided Utah workers with their first acquaintance of wartime production. Employment at the end of 1941 was about 1,000, but increased to beyond 6,000 by November of 1942. There was a reduction to approximately one-half that number at the end of 1943. Employment increased to nearly 4,500 in April 1945, and was slightly above 3,000 in December 1945.  

The Arsenal was typical of the type of facilities built in Utah early in the war. Financed by the War Department, it was placed in Utah for defense purposes rather than for the extraction of some mineral resource. It was a facility built specifically for use during the war and could not be expected to continue production in the postwar period.

Utahns, knowing that Utah's storehouse of natural resources held the key to industrial development, were not content with one plant that utilized only labor. Governor Maw thought Utah could help the nation by offering up its treasures and the nation could reciprocate by building the extractive and productive facilities which would allow Utah to develop its industrial potential. Convinced that it might as well be Utah receiving the government construction funds, the Governor went to

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Washington, D.C. early in 1941.

The Small Arms Ammunition Plant

The Governor in Washington

In April of 1941, Governor Maw conferred with several government officials in an attempt to persuade some further development to be authorized for Utah. The Salt Lake Tribune stated that:

Every loyal citizen of the state, regardless of political affiliations or alignment of preparedness, will wish the governor success on his mission to secure some of the benefits incident to undesirable conditions in which the world is being placed by aggressive powers.16

In the company of the four Congressmen from the state, Governor Maw went to the office of Robert P. Patterson, Assistant Secretary of War. The discussion indicated that there was strong sentiment, on the government's part, for a powder plant or a small arms ammunition plant, or both, to be built in Utah. After the conference, Governor Maw felt encouraged at the possibility of getting a small arms plant for the state, even though a powder plant was eliminated because of the lack of a swift, sizeable and dependable flowing stream.17

16 Salt Lake Tribune, April 11, 1941, p. 20.

17 Ibid., April 9, 1941, p. 7; April 10, 1941, p. 7.
Shortly thereafter, the Governor and Congressmen met with Donald M. Nelson and Edward R. Stettinius of the Office of Production Management.

Nelson assured his callers that he, for one, is opposed to establishing any more new industries in established and industrialized areas; that he wants to get out into new territory away from congested centers, and that, in this respect, the Utah appeal interested him.18

Though Nelson sounded reassuring on the point of a small arms plant, he reminded his audience that he had to wait for recommendation from the War Department.19

Later, the Governor and Democratic Senator Abe Murdock met with Brigadier General C. T. Harris of the Army Ordnance Corps. Harris voiced concern over the inadequacy of the Utah labor supply, but the Governor stated that within a 40-mile radius of Salt Lake City there were 23,000 "employables." He stated further that he had a list of the names of 1,200 persons who had left Utah but would return if employment were available. The Governor went a step further by declaring that the state of Utah would build any roads necessary to give access to the small arms ammunition plant and would guarantee


that they would be completed and ready before the plant went into production.\textsuperscript{20}

Shortly thereafter, the Governor and Senator Murdock met with President Roosevelt, and for the first time heard about plans to give Utah a pig iron plant as part of the national steel expansion program. The President had the proposed Utah expansion brought to his attention only the day before meeting with the Governor and Senator. Although the question of steel expansion was not settled until several months later, it immediately brightened Utah's industrial outlook. So pleased were the Governor and Senator that they are reported to have told the President that if Utah could get the pig iron plant and the small arms ammunition factory, the state's unemployment problem would be solved and there would be "no more unemployed in the state."\textsuperscript{21}

\textbf{The Remington Arms Plant}

Partly as the result of this urging, federal officials, in June 1941, authorized the erection of a $30,000,000 small arms ammunition factory in Salt Lake City. The Salt Lake Tribune reported:

\begin{quote}
\textsuperscript{20}Ibid., April 12, 1941, p. 1.
\end{quote}

\begin{quote}
\textsuperscript{21}Ibid., April 13, 1941, pp. 1-2.
\end{quote}
The small arms ammunition plant represents the largest single defense outlay yet authorized in Utah, and will almost immediately call for employment of thousands of workers during the construction period. After completion it will afford steady employment for other thousands, a large percentage of them women.\textsuperscript{22}

Governor Maw, in a letter to Senator Murdock written on the day of the announcement, wrote: "Congratulations on your good work in the matter of getting a small arms plant for Utah. Everyone out here is rejoicing."\textsuperscript{23} Later in the week, he wrote again to Senator Murdock:

I could not possibly tell you what the small arms ammunition plant has already meant to the people of the State. Everyone is enthusiastic. Hundreds of people are singing your praises as well as those of your associates who worked with you. The plant is certainly the biggest thing that has ever come to Utah and we are very happy and proud.\textsuperscript{24}

The War Department ultimately spent a total of $36,000,000 for the construction and equipping of the factory. In August, the Remington Arms Company, of Bridgeport, Connecticut, was designated as prime contractor for the plant and was awarded a War Department contract for $86,000,000 for operating the new...

\textsuperscript{22}Ibid., June 11, 1941, p. 1.

\textsuperscript{23}Letter from Governor Herbert B. Maw to Senator Abe Murdock, June 11, 1941, Utah State Historical Society Archives.

\textsuperscript{24}Letter from Governor Herbert B. Maw to Senator Abe Murdock, June 16, 1941, Utah State Historical Society Archives.
Manufacturing activities were started in December 1941. By July 1942, employment approached 10,000 persons and held steadily close to that figure until November 1943, when manufacturing activities ceased. The plant was made part of the Ogden Arsenal in 1944 and furnished employment to approximately 1,500 employees until the end of 1945.26

Significance of the Ogden and Salt Lake Plants

The Ogden Arsenal and the Remington plant had particular influence on the Utah employment picture. Between the months of October 1941 and November 1942 there was a 12,393 increase in the number of employees working in manufacturing concerns whose employment and payrolls were subject to unemployment insurance. The Remington plant increased its number of employees during the same period by a total of 10,578.27 In other words, the Remington plant accounted for 85 percent of the increase of the number of employees in "manufacturing" concerns between

25 War Industrial Facilities Authorized, pages not numbered; Salt Lake Tribune, August 15, 1941, p. 1.

26 Mahoney, loc. cit., p. 11.

October 1941 to November 1942.

During the fourth quarter of 1941, the Remington plant had a payroll of $191,000, while in the last quarter of 1942 this figure had risen to $5,700,000, out of a total of $17,000,000 paid in all manufacturing concerns in the state. The annual payroll of the plant reached $22,000,000 in 1943, out of a total manufacturing payroll of over $67,000,000 for Utah.28

The Ogden Arsenal and small arms ammunition plant employed about 10 percent of all the persons engaged in non-agricultural employment in the state during 1942, while offering relief to Utah's unemployed. Utah's insured average weekly unemployment figure in 1938 stood at 5,943, for an insured unemployment rate of 9.76 percent. By 1940, this figure was at 3,922, while during 1942 the average was reduced to 1,769, for an insured unemployment rate of 1.51 percent. The number of individuals receiving unemployment insurance benefit checks in January of 1942 was 4,988, but by November of that same year (at which time the employment at both plants had increased to 16,000), the number stood at 314.29

28 Ibid.
While it cannot be stated for certain that these two plants accounted for all of the reduction, or even that these figures can account for all of Utah's labor force at that time, the effect of the two factories is obvious. Nevertheless, neither plant was built to utilize any Utah resource other than labor. Both were built by the War Department and were strictly wartime facilities which did not represent any significant post-war productive source once the war was over. The Salt Lake Tribune quite pretentiously stated that the Remington plant meant "a permanent industrial establishment, as long as all unconquered countries may remain on the defensive for centuries to come." 30 Had the war ended in January of 1942, however, Utah's wartime industrial development would not have amounted to very much.

30 Salt Lake Tribune, June 12, 1941, p. 10.
CHAPTER III
UTHA'S ALUNITE INDUSTRY DURING WORLD WAR II

Utah's Mineral Resources

By virtue of their state's natural resources, Utahns held the conviction that the national war effort could be aided by utilizing the mineral treasures of the state. A great deal of Utah's industry prior to the war had been directly related to the mineral resources found in the surrounding mountains.

The Bureau of Mines' Mineral Yearbook for 1942 listed over 37 minerals produced in Utah during the period 1940-41, of which such minerals as coal, copper, fluor spar, gold, iron, lead, lime, silver, tungsten ore, vanadium, and zinc were named. During 1940, the mining industry in Utah consisted of 302 firms, and had an annual payroll exceeding $17,000,000. Firms in the chemical, petroleum and coal, stone, clay and glass products, and primary metals industries in Utah numbered 113, and had an annual payroll of $9,500,000 during that same year. Among manufacturing concerns, the primary metals industry, which had an annual payroll in 1940 of $6,600,000 and hired approximately 4,000 workers, was second only to the food and kindred products industry, which hired about 7,000 workers and paid $8,200,000 in payrolls. The mining and the above
manufacturing industries together accounted for over one-quarter of the total annual payrolls paid in all industries during 1940, and hired 18,000 out of the 81,000 workers engaged in all industries in the state.¹

Utah's Alunite Resources

In 1933, Senator Abe Murdock, then a United States Representative from Utah, attempted to bring attention to the alunite and potash deposits found near Marysvale in Piute County. The Bureau of Mines in a survey made in 1932 estimated that the total reserves at Marysvale contained only 300,000 tons of potash or approximately a one year supply. On the other hand, the Bureau estimated that "the 3,000,000 tons of alunite reserves contained 1,000,000 tons of alumina or approximately a 20-year supply."²

The Bureau of Mines reported in 1941 that the alunite deposits in Utah were by far "the most extensive of any known in the United States."³ The Bureau estimated in that year that of the 47,000,000 tons of


³Ibid., p. 20.
alunitized rock in the United States there were over 35,000,000 tons in Piute County alone. It also estimated that Beaver County had about 2,000,000 tons. 4

With increased production of airplanes, which accompanied the war in Europe, there was concern over having a reliable source of the ore bauxite, from which aluminum was produced. Most high-grade bauxite was imported from British Guiana, Brazil, Surinam, and Canada. The Bureau of Mines, reporting on the domestic source of bauxite, stated that only limited quantities of commercial-grade bauxite existed in the United States. Larger deposits of low-grade bauxite existed, but these could not be economically utilized as long as high-grade foreign ore was available. 5

Foreign sources could not always be relied upon, especially in the event that the Panama Canal fell into enemy hands. With concern increasing over sources of bauxite ore, government officials began developing domestic sources, especially in Arkansas, which became the largest bauxite-producing state in the later war years. Utah alunite was one of the sources tried during the war years in attempting to relieve aluminum producers

4 Ibid., p. 36.

5 Ibid., p. 3.
from being dependent upon one domestic source of alumina.

A Senate subcommittee on Public Lands concluded in 1941:

Although most of the new plants producing aluminum will use alumina made from bauxite, yet an important part of the production will come from plants in the West, thereby involving a long freight haul for the alumina. Therefore, the production of alumina in the West from native raw materials such as alunite and high-grade clays is a long time development which seems inevitable, but which should be hastened by the removal of restraints on production that has prevailed for fifty years in the past. 6

Although the wartime attempt to build an alunite industry in Utah was unsuccessful, the alunite plants built in the state during the war are significant for several reasons. First, the Kalunite plant built in Salt Lake City was the first mineral-utilizing plant authorized to be built by the government in the state during the period 1940-45. 7 Secondly, this plant is typical of a number of industrial facilities built in Utah during the war in that it was built to satisfy a


7 Authorizations for expansion of pig iron facilities in Utah were made as early as July 1941, but all authorizations were cancelled or revised until the Geneva steel plant was authorized in November 1941.
demand created on the West Coast. Thirdly, the attempts by Senator Abe Murdock and other Utah Congressmen to obtain an alunite plant were typical of those made to gain the industrial facilities built in the state during the period 1940-45.

Development of Utah's Alunite (1910-1939)

For many years prospectors had known of the vein of "pink spar" that occurred in the high mountains near Marysvale. Many samples of theore were assayed for gold, but it was not until 1910 that the mineral was identified as vein alunite. The veins were immediately recognized as potential sources of potash, and the increased demand for domestic sources of this material brought on by World War I resulted in the discovery of additional vein and replacement deposits. Before many of the replacement deposits were explored to any extent the war stimulus was removed and, except for occasional subsequent shipments for experimental purposes, production and exploration ceased.8

Various mining operations

The vein deposits were mined during World War I by both the Mineral Products Company, a subsidiary of the

Armour Fertilizer Works, Atlanta, Georgia, and the Florence Mining and Milling Company, of Philadelphia, Pennsylvania. The Mineral Products Company is reported to have produced 250,000 tons during its existence. In 1940 some of the plant remained, but many of the structures had either fallen or burned and much of the original equipment had been sold or removed. The treatment plant was about five miles south of Marysvale. The Bureau of Mines in 1941 stated that "the entire plant probably has little salvage value at present in comparison with its original cost."9

The Florence Mining and Milling Company is reported to have produced 12,000 tons during World War I. The alunite from this mine was hauled to a treatment plant just outside the city of Marysvale. The plant was still standing in 1941 and was owned and operated by Aluminum, Incorporated, of Cleveland, Ohio. Aluminum, Incorporated, had patented the Moffat process which was designed to utilize alunite as a raw material for the production of pure alumina, potassium sulfate and other products. The original patentee, R. W. Moffat, is reported to have said that the process had been tested in the laboratory and had

9 Alunite Resources of the United States, p. 21.
successfully produced high-grade alumina which had in turn been made into aluminum.\textsuperscript{10}

In June 1939, Aluminum, Incorporated, mortgaged its property and obtained a loan of $50,000 from the Reconstruction Finance Corporation. The company agreed to repay this loan at the rate of $5,000 per year, but no principal payment was ever made on this loan, and only one small payment of interest, the sum of $380.82, was paid by the company. The company also failed to pay the taxes on the property for the years 1941 to 1943.\textsuperscript{11}

The Kalunite Process

Kalunite, Incorporated, under the direction of Dr. Arthur Fleischer had been conducting extensive research during the 1930's into the chemistry involved in several processes for the reduction of alunite to potassium sulfate, alumina, and metallic aluminum. In 1934, the Olin Corporation, which became interested in the work, bought about 90 percent of the Kalunite Company, and the next year built a pilot plant in Salt Lake City. The plant under direction of Dr. Fleischer extracted fifty tons of satisfactory alumina from alunite in 1939. The project was

\textsuperscript{10} \textit{Ibid.}

later moved to the Battelle Memorial Institute in Columbus, Ohio, and there produced several tons of metallic aluminum.\textsuperscript{12}

The Aluminum Company of America, which made an investigation of the Kalunite process in 1934, maintained that alumina from alunite contained enough potash to damage the reduction equipment and that its grain size was so fine that huge dust losses would occur. Kalunite's researchers, however, were confident that the process would work equally well with low-grade bauxites or with clays, of which domestic deposits were incalculable.\textsuperscript{13}

Aluminum Expansion During World War II

In the year immediately preceding the beginning of World War II, the American aluminum industry was centered around the Aluminum Company of America, the only primary producer and the major fabricator. Four reduction plants approximating over 300,000,000 pounds capacity were in operation. Secondary capacity was less than 100,000,000 pounds, while total fabricating facilities were barely adequate to process the available metal.\textsuperscript{14}

\textsuperscript{12} Alumite Resources of the United States, p. 22; "Aluminum: Have or Have Not?” Fortune, December, 1943, p. 262.

\textsuperscript{13} Ibid.

During the war, the industry was expanded to meet vital strategic requirements. When the expansion had been completed, a second integrated producer had entered the industry, the country's ingot capacity had been increased to 2,300,000,000 pounds, secondary recovery had been multiplied by five, and the fabricating system had a machine capacity of approximately 2,600,000,000 pounds. "The United States had become the world's foremost aluminum producer and fabricator, with 42 percent of the world's primary capacity and a fabricating system exceeded by none."\textsuperscript{15}

Congressional interest was focused on the supply situation in May 1941 when the Senate's special committee investigating the defense program heard testimony from representatives of the aluminum industry, and the government. The hearings pointed out the need for increasing production and hastened decisions for the expanded program.\textsuperscript{16}

By November 1, 1941, the entire expansion had been planned and the construction proceeded under the supervision of the Aluminum Company of America's engineering staff.

\textsuperscript{15} Ibid.

\textsuperscript{16} Ibid., p. II-10; see also, U. S. Congress, Senate, Special Committee Investigating National Defense Program, Hearings, Investigation of the National Defense Program, 77th Cong., 1st Sess., 1941, pt. 3.
Choice of operating companies for the plants was narrowed to the Aluminum Company of America, Bohn, Union Carbide, and Olin. Bohn and Union Carbide withdrew, while Olin contracted with the Defense Plant Corporation to operate a plant at Tacoma, Washington. The other plants were assigned to the Aluminum Company of America.\textsuperscript{17}

With the tremendous aluminum-production program planned, known domestic reserves of high-grade bauxite were estimated to be exhausted within a few years if dependence were placed entirely on them. In view of this situation, Congress appropriated funds in the fall of 1941 for a more comprehensive investigation by both the Bureau of Mines and the U. S. Geological Survey to find the occurrence, extent, and quality of domestic bauxite, alunite and high-alumina clay.\textsuperscript{18}

The Kalunite Plant During World War II

World War II gave Utahns reason to believe that the alunite deposits in the vicinity of Marysvale would at last be developed. Prospects looked attractive with the

\textsuperscript{17}\textit{Materials Survey: Aluminum}, p. II-10.

\textsuperscript{18}\textit{Minerals Yearbook}, 1941, p. 659.
national aluminum expansion gaining momentum and the government offering to build plants and factories for the war effort.

In July of 1940, Senator Murdock and S. P. Dobbs, Democratic national committeeman for Utah, met with George L. Batt, then an assistant in the Defense Council, to urge federal funds in expanding the plant owned by Aluminum, Incorporated, at Marysvale. It was reported that Mr. Batt at first was not interested in plans for building new plants, but wanted an immediate supply of alumina. The Senator pointed out to the official that the Marysvale plant was already in operation, although the plant was in a somewhat retarded condition.\(^{19}\)

Not long after the conference the Reynolds Metal Company of Raleigh, North Carolina offered to take the entire output of Aluminum, Incorporated, if the alumina from Utah alunite could be produced commercially and at a favorable price. In addition, the Reynolds Company offered to advance $200,000 to bring the daily output up to 50 tons.\(^{20}\)

\(^{19}\) *Salt Lake Tribune*, July 30, 1940, p. 15.

Seven months later, in March 1941, Senator 
Murdock called on President Roosevelt in an attempt to 
interest him in a plan calling for expansion of the 
Marysvale plant. The Senator reported that the Presi- 
dent seemed interested in the project. In June, the 
Senator moved to broaden an investigation of methods of 
producing aluminum from low-grade bauxite to include 
alunite by introducing an amendment to the Interior 
Appropriations Bill. The Bill called for $85,000 for 
the investigation, part of which the Senator hoped would 
be used to investigate both the Moffat process, of Aluminum, 
Incorporated and the Kalunite process of Kalunite, 
Incorporated. 21

The Senator was apparently successful because the 
Interior Department Appropriation Act for 1942, approved 
by Congress June 28, 1941, allocated a total of $85,000 
for the:

Production of alumina from low-grade bauxite, 
aluminum clays and alunite: For all expenses 
necessary to the conduct of investigations and 
research on processes for production of 
alumina from silaceous bauxites, aluminum clays 
and alunite. 22

The amendment proposed by Senator Murdock instructed 
the Bureau of Mines to use half of the $85,000 for study

21Ibid., March 14, 1941, p. 4; June 4, 1941, p. 20.
22U. S. Congress, Interior Department Appropriations 
114, 1942, p. 163.
of the alunite processes, although the law itself did not specify any particular amount to go to either bauxite, aluminum clays, or alunite investigations.

In addition, the Senate Committee on Appropriations recommended that the appropriation for investigation of bauxitic ores, under the Second Supplemental National Defense Appropriation Act, be made available also for investigation of alunite ores and aluminum clays. The Act passed in October 1941 provided a total of $415,000 for the:

Investigation of bauxite and alunite ores and aluminum clay deposits: for all necessary expenses for investigation, including laboratory research and procurement of materials therefore, concerning the extent, occurrence, and quality of bauxite and alunite ores and aluminum clays in order to determine domestic sources of supply.23

In June of 1941, Secretary Ickes of the Department of the Interior testified before the Senate committee investigating the national defense program that aluminum could be produced from Utah alunite by a tested and approved process at a cost cheaper than that of using bauxite. The Secretary also told the committee that a plan for

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utilizing Utah alunite and converting it into aluminum had been proposed to the Office of Production Management by the Interior Department in April, but by June nothing had been done about the plant.24

One month later, Secretary Ickes informed Utah Congressmen that the aluminum expansion program then underway contemplated the production of aluminum solely from bauxite, and did not contemplate the use of alunite in any plant, although the Secretary had protested to the President over the apparent discrimination against alunite by the Office of Production Management. The President evidently mediated the controversy between the Office of Production Management and Secretary Ickes because within a week Arthur Bunker, chief of the aluminum division of the Office of Production Management, was quoted as saying that Utah alunite would "definitely have a place in the expanded aluminum production program."25

Mr. Bunker stated further that it was the intention of the Office of Production Management to have the Olin Corporation operate an aluminum plant at Tacoma, Washington that would use alumina made from Utah alunite. Frank


25Salt Lake Tribune, July 17, 1941, p. 3; July 21, 1941, p. 4.
Eichelberger, representative of the Olin Corporation in Washington, when told of the latest proposal was quoted as saying:

"It's all new to me. We have never been told we were to use alumina derived from alunite; we do not even have definite assurance that we are to operate an aluminum plant at Tacoma, and we have not expressed delight over any decision by OPM, for as far as we know there has been no decision." 26

In July 1941, the National Academy of Science approved as feasible and practical the Kalunite process of producing alumina. The Academy had been investigating the process for over one month. In the following month, W. L. Batt, then deputy director of production in the Office of Production Management, testifying before a subcommittee of the Senate Committee on Public Lands and Surveys, stated that his office proposed to "recommend to the Army and to the R.F.C. the approval of a program of substantial production of alumina from alunite." 27

Just when it looked as if Utah would obtain the alumina plant, Arthur Bunker, head of the aluminum division of the Office of Production Management, expressed

26  Ibid.

concern over the question of whether or not there was sufficient alunite in the state to justify the government in financing a plant. The concern was based on the report of the technical committee of the National Academy of Science which had met in New York during August. Such concern was voiced in apparent disagreement with the Bureau of Mines' report made in February of 1941, which stated that Utah possessed 74 percent of the 47,000,000 tons of alunitized rock in the nation. On the day following, the Bureau of Mines reaffirmed its February findings. It also claimed that there had been no recommendation by the Office of Production Management to Reconstruction Finance Corporation or the War Department that the alunite plant be built.28

Harry S. Truman, who at the time was U. S. Senator from Missouri, headed the Senate committee investigating the defense program, and was reported as saying that he doubted that the Office of Production Management was interested in obtaining alumina from Utah's alunite because the Aluminum Company of America had "the OPM by the throat."29

28Salt Lake Tribune, August 7, 1941, p. 2; August 8, 1941, p. 17.

29Ibid., August 15, 1941, p. 17.
A report by that committee in 1941 stated:

The Office of Production Management has not only not encouraged but actually has discouraged research and experimentation in the use of alternate processes for the production of aluminum from low grade bauxite or other sources such as alunite. On the other hand, the Department of Interior, through the Bureau of Mines, has encouraged the development of processes which involve the use of basic materials other than high-grade bauxite. The Bureau of Mines is now conducting such experiments with the cooperation of the inventors of the processes. A report recommending alunite as a source from which to produce aluminum was prepared by the Bureau of Mines and sent to the Office of Production Management more than 6 weeks ago, but the Office of Production Management has not yet acted on it.30

In discussing the monopoly position enjoyed by the Aluminum Company of America, the committee concluded that the reluctance exhibited by the Office of Production Management in developing any other source of alumina might be explained by the fact that, as far as aluminum was concerned:

Alcoa had convinced the Office of Production Management of the adequacy of the supply in order to avoid the possibility that any one else would go into a field which they had for so many years successfully monopolized.31

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31 Ibid., p. 3.
Indeed, it could be said that Alcoa had good reason for attempting to discourage competitors in the field of alumina production, since 96 percent of the production of alumina was centered in four plants owned or operated by that firm.32

Senator Murdock conferred a week later with W. L. Batt, of the Office of Production Management, in an attempt to find out what was delaying the alunite development. Mr. Batt is reported to have told the Senator that the delay was not the fault of the Office of Production Management, but that his office was awaiting supplemental investigations that were to be made by the Bureau of Mines. Only a week before, Mr. Batt had announced that a man from his office had been sent out to Utah to check on the alunite deposits. Now he claimed that the man had not been sent out by the Office of Production Management, but that he was a metallurgist from the Bureau of Mines sent to check on the alunite process.33

Secretary Ickes, when confronted with the report of the new survey, said that no new investigations of the

32 "Aluminum, Have or Have Not?" Fortune, p. 138.
33 Salt Lake Tribune, August 15, 1941, p. 27.
processes or deposits were being made by either the U. S. Geological Survey of the Bureau of Mines. He stated that their investigations were complete, that they were satisfied as to the quality and the extent of the alunite, and were convinced that there was ample supply to justify the establishment of an alumina plant. 34

Two days later, the Office of Production Management, the Bureau of Mines, and the U. S. Geological Survey tentatively agreed that the government should advance the funds to the Kalunite Company of Salt Lake City to build a one-unit plant at Marysvale. The agreement contained the condition that if the one-unit plant established the commercial feasibility of the process other units would be authorized. On August 18th, Senator Murdock was informed by W. L. Batt that the Office of Production Management had proposed to the War Department and the Reconstruction Finance Corporation a plan for producing alumina from Utah alunite by providing for $5,000,000 for a processing plant at Marysvale or Salt Lake City. 35

The plan called for the Utah plant to handle 100 tons of alunite daily, from which the alumina produced would be

34 Ibid.

sent to Tacoma, Washington to be processed into aluminum by the Olin Corporation, mother company of Kalunite, Incorporated. Frank Eichelberger is reported to have said that a plant handling only 100 tons of ore a day was "not a commercial plant, but is, at best, a glorified pilot plant." Mr. Olin, of the Olin Company, indicated that a plan under which they might market 100 tons of alumina per day would be acceptable, but there was a vast difference between 100 tons of alumina and 100 tons of alunite. A plant producing 100 tons of alumina per day, he believed, would sustain the needs of the Tacoma plant.

At the end of August, the Office of Production Management requested that the Kalunite Company submit what it considered the smallest feasible commercial unit for a plant to produce alumina from alunite. The Kalunite Company, voicing concern over the size of the plant, claimed that a feasible operation would be the plant producing 100 tons of alumina per day, which would call for 350 to 500 tons of alunite ore. In other words, a plant four to five times as large as the one originally suggested by the Office of Production Management.

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36 Ibid., August 22, 1941, p. 15.
37 Ibid., August 23, 1941, p. 13.
38 Ibid., August 30, 1941, p. 17; September 3, 1941, p. 11.
The plant which Kalunite proposed to the Office of Production Management was designed to turn out 100 tons of alumina a day, and would cost $2,300,000. At the same time, a technical committee of the National Academy of Science suggested a plant be built with a daily capacity of 35 tons of alumina, at a cost of $1,100,000. The committee recommended that the process be proved commercially-feasible before expanding to 100 tons per day.39

During September, the Defense Plant Corporation reached an oral agreement with the Olin Corporation under which the company would operate a government-owned aluminum plant in Tacoma. This plant was to be capable of producing 30,000,000 pounds of aluminum annually. The agreement, however, did not involve construction of a plant in Utah to produce alumina.40

Shortly after the agreement was reached with the Olin Company concerning the Tacoma plant, Kalunite proposed another plan. This plan called for consideration of both the Tacoma plant and the Utah alumina plant as one operation, since they were to be dependent upon each other. The plan also called for a three-unit plant to be built at Lehi at a cost of $2,300,000. This three-unit plant was

39 Ibid., September 13, 1941, p. 17.
40 Ibid., September 16, 1941, p. 9.
to be in addition to requesting funds to be used for mining of alunite at Marysvale. 41

Several reasons were given for the switch from Marysvale to Lehi. It was stated that Lehi was near an enormous amount of aluminous clay, which could be drawn upon after the Marysvale deposits had been exhausted. Furthermore, Lehi was closer to housing facilities and a larger labor supply. 42

At the end of September, it was announced that the Defense Plant Corporation and the Olin Corporation had reached an agreement in which the government would advance funds for building a one-unit plant at Lehi, with the agreement that if the plant should commercially produce alumina two more units would be added. One month later, Kalunite was authorized by the Defense Plant Corporation to build an alumina plant in Lehi, for which the government would advance $1,500,000. An additional $500,000 was authorized for the purpose of beginning mining operations at Marysvale. 43

In January of 1942, consideration was given to building the plant in Provo rather than in Lehi, since the plant

41 Ibid., September 17, 1941, p. 17.
42 Ibid., September 21, 1941, p. 18.
43 Ibid., September 26, 1941, p. 1; October 25, 1941, p. 15.
was to use natural gas and gas rates at Provo were cheaper. In February, however, it was decided that the plant was to be built in Salt Lake City, and that the company would receive an additional $1,000,000, thus bringing the total to be spent for the plant to $3,000,000. The capacity of the plant was to be 167 tons of alunite per day, with the agreement that if the plant proved to be commercially successful the capacity would be increased to 500 tons per day.\textsuperscript{44}

In April, the Kalunite Company requested funds to treble the capacity of the plant to increase production of alumina to 105 tons per day. Kalunite estimated that the increase could be met with an additional sum of $875,000 from the government. The request was not then granted to the company. In October of 1942, the annual capacity of the plant stood at 30,000 tons which was ultimately increased to 36,000 tons annually, or approximately a 100-ton daily capacity.\textsuperscript{45}

\textsuperscript{44} Ibid., January 22, 1942, p. 13; February 3, 1942, p. 1.

Development of Aluminum, Incorporated, at Marysvale

In June of 1942, Aluminum, Incorporated made application to the Reconstruction Finance Corporation for a loan of $800,000, in addition to the $50,000 it had borrowed in 1939, for the purpose of erecting a plant capable of producing 70 tons of alumina per day. This application was subsequently revised and changed to $775,000. In the revision the company stated its desire to erect a plant which would produce 40 tons of alumina per day which would cost $480,000. The revised application was accompanied by a letter from the Dorr Engineering Company of New York, stating that the plant could be built for the $480,000 and that they would construct it. Also attached was a copy of a contract with Metals Reserve Company, a subsidiary of the Reconstruction Finance Corporation, to sell 50,000 tons of alumina at $40 a ton.46

On May 4, 1943, a conference was held by representatives of Dorr, The Bureau of Mines, and the Reconstruction Finance Corporation for the purpose of considering the feasibility of the project. The Bureau of Mines representative stated that he thought the plant could be

constructed for the estimated $480,000. 47

On May 13, the Reconstruction Finance Corporation announced a loan of $775,000 to Aluminum, Incorporated. The initial installation of the plant was to have a capacity of 30 to 40 tons of alumina per day, which was to be produced by the Moffat process. In June, the Dorr Company completed an investigation of the proposed plant and made a report to the Aluminum company in which it stated that the estimated cost of a 20-ton plant, after using existing building and equipment, and by purchasing used equipment where possible, was $894,000, and that the estimated operating cost would be approximately $176 per ton. 48

In July, the Dorr Company asked to be relieved of the construction job because the Defense Plant Corporation stipulated that second-hand equipment and materials were to be used almost exclusively on the job. Later in the month, the H. K. Ferguson Company was substituted in the place of the Dorr Company with the consent and approval of the Reconstruction Finance Corporation. In the contract

47 Ibid.

with Aluminum, Incorporated, the Ferguson Company stated that the estimated cost of the work, exclusive of engineering fees, was $371,000.49

In July 1943, a further national expansion of alumina capacity was proposed, totaling 300,000 tons. However, this proposal was quickly shelved as it became increasingly apparent that alumina stocks were growing too rapidly and that consumption at reduction plants was to be cut.50

In October, the War Production Board revoked its order allocating $4,000,000 to build an experimental plant in the Pacific Northwest to work on methods of extracting alumina from clay. The reason given for the cutback was lack of labor. One week later the Reconstruction Finance Corporation placed a stop-order on the project of Aluminum, Incorporated, and advised the company to make no further expenditures under their allotment of $775,000, but to hold the project in suspense pending decision as future policy.51

Senator Murdock tried to draw a distinction between the Marysvale alumina plant and the projects for extracting


50 Minerals Yearbook, 1943, p. 695.

51 Salt Lake Tribune, October 5, 1943, p. 4; October 14, 1943, p. 20.
aluminum from clay in an attempt to persuade the Reconstruction Finance Corporation to recall its stop order. The Senator pointed out that the funds had already been allocated, and that 60 percent of the plant was already in existence. By the end of October, the stop order had been recalled by both the War Production Board and the Reconstruction Finance Corporation.\(^\text{52}\)

In November, the Ferguson Company submitted plans and specifications for a 40-ton plant at an estimated cost of $3,300,000. It also declared that if the process worked at all the capacity of the plant would have to be increased to 100 tons per day in order to make it pay. The plans, as prepared, were rejected jointly by the Bureau of Mines and Aluminum, Incorporated.\(^\text{53}\)

Later in the month, the Ferguson Company returned to the government a new plan which called for construction of a pilot plant to cost $721,909 plus $300,000 in working capital. The plan also called for construction of a 100-ton plant at an additional cost of $7,200,000 if the pilot plant proved satisfactory. Following this proposal

\(^\text{52}\) Ibid., October 16, 1943, p. 16; October 30, 1943, p. 15.

there was a complete report of the entire situation made by the Reconstruction Finance Corporation. The report was sent to the War Production Board, and the Board recommended that nothing further be done with the company's project.54

At the end of 1943, the stocks of aluminum were accumulating so rapidly that outbacks in production totaling 30 percent of installed capacity were made between December 1943 and July 1944. The cutbacks discontinued any expansion of the facilities of Aluminum, Incorporated, at Marysvale.55

In January 1944, the Reconstruction Finance Corporation cancelled all contracts with the company. It was the conclusion of the government that the company was in complete default of performance on its commitments under the loan contract. In that same month, the government instituted an action in the United States District Court for the district of Utah against Aluminum, Incorporated, to recover judgment on two promissory notes and to foreclose a mortgage given as security. The first note was for


$50,000 and the other for $775,000. On the latter note, the government asked judgment for only $10,108, which was the amount advanced to the company. The answer of the company was that the Reconstruction Finance Corporation was not entitled to any judgment since the company had suffered damages as a result of an alleged breach of contract by the Reconstruction Finance Corporation, in the sum of $1,142,560. The loss for which the company sought judgment in its counter claim was a supposed profit which it claimed it would have realized under the contract with the Metals Reserve Company. The trial court dismissed the counter claims and entered judgment in favor of the government in the amount asked for, and for the foreclosure of the mortgage.56

In February of 1945, the company appealed the case. Judge Huxman in deciding the case in November of 1945, in the Circuit Court of Appeals, upheld the decision of the trial court and stated that the Reconstruction Finance Corporation was "not a charitable institution or an experimental laboratory."57


57 Ibid., p. 656.
Plans for an Aluminum Plant

In addition to proposals for alumina plants in the state, in 1942, there was some consideration given to the building of an aluminum plant in Utah. Senator McNary of Oregon had protested in early 1942 against plans that the new defense industries authorized for the Pacific Coast States be placed at less vulnerable inland sites. Under consideration was a plan to build aluminum plants scheduled for Troutdale, Oregon, and Los Angeles, California in either Boise, Seattle, or Salt Lake City.58

In an editorial, the Salt Lake Tribune stated:

Under the circumstances, viewing the urgent needs of the Nation in the light of recent developments, it is difficult to understand the Oregon Senator's protests. To favor one's home enterprise is laudable, but not when such cause is advocated at the expense of the people and the government as a whole. The Senator desires to please his constituents, of course, but in time of national peril his duty as a member of the highest lawmaking body on the continent extends beyond the boundaries of any state or section.59

Utah, of course, was strictly concerned with national interest rather than the development of its own industry. This false pride of ownership was in vain, however, for within a very few days Senator Murdock, in a telegram to

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59 Ibid., January 4, 1943, p. 14A.
Governor Maw, said:

Concerning aluminum rolling mills, Under Secretary Patterson of War Department advises me that plants originally scheduled for Troutdale and Los Angeles are to be consolidated into one plant located at Spokane. This plant will require 55,000,000 kilowatt hours of electricity which is not available in Utah.60

A boost for Salt Lake City as the site for part of the aluminum plant scheduled for Spokane was given about a week later. J. L. Haugh of the Union Pacific Railroad, explained to Senator Murdock that the fabricating plant would require 65,000 kilowatts, or just about the quantity of power used by the Utah Copper Company. The company was then building its own power plant and when it began using its own power, it would release 75,000 kilowatts. The entire plan was halted later in January of 1943 by government officials.61

Postwar Status of the Kalunite Plant

Although the Kalunite plant was completed in 1943, the Bureau of Mines reported that the plant had been

60 Telegram from Senator Abe Murdock to Governor H. B. Maw, January 6, 1942, Utah State Historical Society Archives.

61 Salt Lake Tribune, January 10, 1942, p. 17.
disappointing in results, and the production had been less than five percent of capacity. As late as June 1944 there was no prediction as to when the plant would be in commercial operation. In July of 1945, the Defense Plant Corporation reached the conclusion that there was no object in continuing the operation of the plant. The government reached the decision claiming that the plant had never succeeded in getting into commercial operation.  

In August, the Reconstruction Finance Corporation notified the company that they would be given 90 days to proceed with the determination of the technical and commercial practicability of the process used by Kalunite. The extension was due to the Senate Small Business Committee, which had recommended to the Defense Plant Corporation that the company be given $60,000 a month for three months to prove the feasibility of the plant. If after the three months the plant was not a success, then the plant could be declared surplus property, unless the Bureau of Mines was interested in the plant. As the Salt Lake Tribune pointed out, "it is a 100 to 1 bet that the Bureau of Mines doesn't want it."

In December 1945, the Defense


63 Ibid., August 6, 1945, p. 6; October 7, 1945, p. 18.
Plant Corporation advised the Surplus Property Administration that the Kalunite Plant should be closed down.\textsuperscript{64}

In 1946, the plant was declared surplus property and put up for sale. In March 1947, three companies bid on the plant, the highest bid being submitted by the Emerald Mining Company, of Elko, Nevada. The two other bidders were Sterling Chemicals, Incorporated, of New York City, and the J. R. Simplot Company, of Idaho. In May of 1947, the high bid was approved by the War Assets Administration, only to have the company withdraw its bid later in the month.\textsuperscript{65}

In August 1947, the War Assets Administration received new offers for the plant with J. R. Simplot bidding highest, at $510,000. In September, the administration rejected the bid as being too low. In November, new bids were received, and the American Potash and Chemical Corporation, of New York, offered $752,000 for the plant, with the assurance that it was prepared to spend an additional $750,000 in reconverting the plant for the production of phosphate fertilizer. However, the plant was sold in December to J. R. Simplot, of Boise, Idaho,

\textsuperscript{64} Ibid., December 20, 1945, p. 15.

\textsuperscript{65} Ibid., March 21, 1946, p. 13; May 27, 1943, p. 9.
for $752,000, with the understanding that the plant was to be reconverted into a phosphate fertilizer plant.

The Salt Lake Tribune stated:

Acquisition of the Kalunite plant here in Salt Lake City by an Idaho man who plans to convert it into a phosphate fertilizer factory was the best news of the week for intermountain business and provided a splendid yule gift for this city.66

Accomplishments of the Kalunite Plant

During the War

The plant at Marysvale cannot be considered to be either a success or failure in the production of alumina during the war, since it was not developed to any extent. However, some conclusion can be reached concerning the $5,454,000 plant in Salt Lake City. The Bureau of Mines reported that during 1943 the plant received 12,000 tons or ore from the mines in Marysvale. In 1944, R. L. Sebastian and C. C. Heikes, both of the Magnesium and Aluminum Division of the War Production Board, testified before a House Subcommittee on Irrigation and Reclamation that the plant in 1944 was producing only about five tons per day.67


67 War Industrial Facilities Authorized; U. S. Department of the Interior, Bureau of Mines, Exploration of
In 1950, Dr. Arthur Fleischer, in a report presented before the American Institute of Mining and Metallurgical Engineers on the production of aluminum from Kalunite alumina, stated that Kalunite alumina had produced commercially acceptable metal. The Tacoma plant during the war, however, reduced only 1,200 tons of Kalunite alumina to produce more than 600 tons of metallic aluminum. In addition to not producing to capacity, however, Kalunite alumina produced slightly less pure aluminum metal per pound of alumina, required more the refining element cryolite, more electric current, and more skimming than alumina made from bauxite.68

The aluminum plant at Tacoma had not been completely successful either. The Attorney General of the United States, in a report made in 1945 on the aluminum industry, stated that although this plant had the benefit of a tidewater location and an economical source of power, had been one of the highest cost producers of aluminum in the country. The costs reported in 1943 were all about three cents per pound higher than most producers.

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68 Salt Lake Tribune, March 19, 1950, p. 10C.
on the coast. The extra costs were due to labor costs, and the use of certain materials, such as cryolite and aluminum fluoride. Since the use of more cryolite for the Kalunite alumina was pointed out as one of the defects of Utah alunite, the high costs might erroneously be blamed on the use of the Utah product. However, Mr. Heikes of the War Production Board stated that most of the alumina for the Tacoma plant came from Hurricane Creek, Arkansas, and that only two percent of alumina shipped to the plant was from the Kalunite plant in Utah.69

The Attorney General, in his report, concluded that unless cost could be pared down, the Tacoma plant would be "one of the least likely to be able to produce at a profit."70 As far as alunite was concerned, he stated that:

A wide variety of minerals contain relatively large amounts of aluminum, including bauxite, alunite, lucite, feldspar, and very common clay. Thus far, however, bauxite has proved to be the only commercial ore of aluminum.71

Most of Utah's industrial development during the war was not as unsuccessful as was the alunite experience. The


71 Ibid.
significance of the plant certainly does not come in its relation with labor. Employment at the plant reached nearly 100 by December 1942, and was increased to 250 by December 1943. The average employment of 165 was maintained through 1945.\textsuperscript{72}

The value added by the manufacturer did not amount to very much, and it did not result in any postwar productive facility, at least for the purpose for which it was intended. It was simply an attempt on the part of Utahns, though unsuccessful to be sure, to build industry around the mineral resources of the state. It was an industry which was brought on by the war stimulus, and without which would probably never have been seriously attempted.

Yet, Utah alunite had been successful within its own right. Out of fully 232 processes which had been worked out for deriving alumina from common clays and other native ores besides bauxite, and out of the four accepted, only the Kalunite process resulted in a commercially designed plant built during the period 1940-45 to produce alumina from alunite.\textsuperscript{73}

\textsuperscript{72} J. R. Mahoney, "Economic Changes in Utah During World War II," \textit{Utah Economic and Business Review}, June, 1946, p. 11.

\textsuperscript{73} U. S. Congress, House, \textit{Columbia River and Its Tributaries}, p. 1507.
CHAPTER IV

UTAH'S STEEL INDUSTRY DURING THE WAR

Introduction

As one of the most basic products of the economy, steel was one of the first products affected by the war in Europe. Indeed, the adequacy of steel facilities in America in meeting increased demands was questioned as early as June of 1940. There never was complete agreement on exactly how much steel capacity the United States should have, but when the wartime expansion was completed there had been $2,500,000,000 spent on new steel-producing facilities. American steel capacity was expanded from 82,000,000 to 96,000,000 tons per year. Of the total new investment, the government contributed about $1,210,000 and private industry paid the balance. Some 29 new plants were constructed, at a cost to the government of at least $5,000,000 each, with an aggregate cost amounting to $770,000,000.1

One of the most famous and important plants built by the government during the war was the Geneva Steel Plant

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constructed in central Utah. It was the most expensive project of the Defense Plant Corporation, and was the most important wartime development for the state of Utah. Approximately $215,000,000 was spent for steel and pig iron facilities in the state during the war, of which Geneva received $190,000,000.2

The National Steel Expansion Program

Adequate steel capacity for the nation was one of the most controversial industries on the list of industries scheduled for expansion. The huge armament program contemplated by the President in 1940 created skepticism on the part of certain government officials as to the adequacy of existing facilities in meeting new military and foreign demands. In 1939, a total of $121,000,000 had been spent for new equipment in the steel industry, and in 1940 the industry contemplated spending more than $146,000,000. However, skeptics pointed out that the 1940 program consisted mostly of the purchase of new and up-to-date equipment to supplant older installations. The annual capacity of the basic steel industry at the beginning of 1940 was about 81,000,000 net tons. Since finished steel

2U. S. Civilian Production Administration, War Industrial Facilities Authorized, July 1940 to August 1945, pages not numbered.
production then ran about 75 percent of ingot output, there was a 60,000,000-ton capacity of hot-rolled steel products.³

In the middle of 1940 the controversy over steel capacity flared up. While certain governmental officials were skeptical, the steel industry believed that it was capable of meeting any increased demand. Irving Olds, chairman of the board of the United States Steel Corporation, said in September of 1940 that the elasticity within the industry would permit an ample steel supply, although some system of priorities might have to be worked out. In December, Ernest T. Weir, chairman of the National Steel Corporation, restated the belief that the industry was adequate to meeting any demand. The New York Times estimated that production capacity at the beginning of 1941 would be 83,000,000 net tons, of which war requirements would take 21 percent of that total, leaving 65,500,000 for civilian use. Since civilian consumption in 1940 amounted to only 56,400,000 tons of ingot steel, it was estimated that there was ample capacity existing in the industry.⁴

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³New York Times, February 16, 1940, p. 29; September 22, 1940, Sec. III, p. 3.

⁴Ibid., September 19, 1940, p. 33; December 21, 1940, p. 8; December 22, 1940, Sec. III, p. 1.
In January 1941, a serious study of American steel production capabilities was initiated by Gano Dunn, Chief engineer and member of the National Defense Advisory Commission. The purpose of the study was to determine if expansion should be speeded up or continue as then planned, and just how much more capacity would be required. In February, spokesmen for the industry conferred with W. S. Knudsen of the Office of Production Management and agreed to enlarge existing facilities. The program contemplated expanding the industry by more than 2,500,000 tons, and would be a gradual increase rather than a rapid expansion. The representatives also agreed at that time that the report being prepared by Dunn would be used as the basis for increased expansion in the future.5

In February, the Dunn report was made public. It estimated that if certain measures were taken there would be an excess of ingot-producing capacity in both 1941 and 1942, assuming the expansion planned by the industry proceeded according to schedule. The estimate for 1941, which was based on a national income of $80,000,000,000, stated that the total defense, foreign, and civilian requirements for that year would total over 75,000,000 tons.

5Ibid., January 12, 1941, Sec. III, p. 1; February 1, 1941, p. 25.
This would leave a surplus of about 10,000,000 tons in capacity. Assuming a national income in 1942 of $90,000,000,000 the report concluded that there would be a surplus capacity of 2,000,000 tons.6

Between February and May of 1941, several national and international events made the Dunn estimates inaccurate for forecasting national steel requirements. Government economists during that period forecast a national income of $100,000,000,000 for 1942, and even suggested that military, foreign, and civilian needs for steel would run between 110,000,000 and 120,000,000 tons. In March 1941, the Lend-Lease Act was passed, and committed $7,000,000,000 to foreign nations at war. In addition, between those two months there was an acceleration of the national defense program, and an increase in private consumer demand due to increased incomes. Irving Olds declared in May that some enlargement of the existing steel capacity might be necessary, though he called for "statesman-like" caution in formulating any expansion program. In the light of these events, a second investigation was made by Gano Dunn on the nation's steel capacity.7

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6Ibid., March 1, 1941, p. 6.

7Ibid., May 8, 1941, p. 15; May 23, 1941, p. 15.
The second report, made public on May 28th, stated that in both 1941 and 1942 there would be a deficit in the supply of steel if existing facilities were not expanded more than scheduled. The combined military, foreign, and civilian demands for steel, the report concluded, would exceed capacity by 1,400,000 tons in 1941 and 6,400,000 tons in 1942. The report estimated that maximum reliable capacity of the steel industry as of December 1941 would be 91,000,000 tons annually, therefore it was necessary to expand steel capacity by 10,000,000 tons.8

The New York Times, commenting on the second report, stated that:

Here is the nub of the matter. No one who follows the swift and tragic course of world events can fail to understand that time is everything. If Mr. Dunn's calculations are correct . . . the proposition that we build even 10,000,000 tons of additional capacity means stealing time from our current vital effort in order to provide two years hence an additional capacity which it may then be too late to use. It means filching 4,160,000 tons of steel, plus men and manufacturing capacities sorely needed for defense at this moment, to increase capacity two years hence.9

8Ibid., May 29, 1941, p. 13.
9Ibid., June 4, 1941, p. 22.
On June 4, 1941, the Office of Production Management asked the steel industry to make plans for expanding productive capacity by the necessary 10,000,000 tons. Jesse Jones, Secretary of Commerce and head of the Reconstruction Finance Corporation, said that the government would make funds available to finance a large part of the cost of construction. In the middle of June, Gano Dunn left his position in the government to return to private industry allegedly due to poor health, although he had been under severe criticism by some for his forecast of a steel deficit.10

The authorization for the expansion of 10,000,000 tons of capacity came in September when the Supply Priorities and Allocations Board announced that it was their policy to encourage the provision of 10 million tons of additional steel-making capacity, including 3 million tons already approved, to encourage the provision of integrated facilities necessary for this expansion, and to encourage the provision of additional pig iron needed to offset the shortage of scrap. The Office of Production Management is directed to take appropriate action to effectuate this policy.11

10 Ibid., June 5, 1941, p. 13; June 14, 1941, p. 9.
11 U.S. Civilian Production Administration, Bureau of Demobilization, Minutes of the Supply Priorities and Allocations Board, 1946, p. 12.
In August, steel was placed under 100 percent priority control to insure that defense requirements would be met. When the United States entered the war, basic steel capacity in the United States had been increased by approximately 5,000,000 tons a year, and of the 10,000,000 ton increase which had been ordered it was highly probable that at least 7,000,000 tons would be completed in time for use in the 1943 program.12

The expansion of a basic industry of the war was finally authorized by the government only three months before the attack on Pearl Harbor. This decision was to affect Utah's wartime industry more than any other single decision other than the later decision to build the Geneva Steel Plant.

Utah's Steel Expansion During the War

An early Utah industry

Iron manufacturing was not a new industry to Utah. The manufacturing of iron in the State began a few years after the Mormon pioneers arrived in the Salt Lake Valley.

In 1851, a "pioneer iron mission" was founded by the Mormon Church at Cedar City with the enlisting of thirty-five men who were skilled in mining and manufacturing. After almost ten years of labor, the project resulted in nothing more than a few andirons, kitchen utensils, flat irons, wagon wheels, molasses rolls, and machine castings. "Small, volunteer, cooperative industry was simply unable to cope with the problems associated with developing a major resource." \(^{13}\)

The Columbia Steel Corporation in 1922 purchased ore properties in Utah and began mining iron ore. It erected a battery of 33 byproduct coke ovens and a 450-tons blast furnace at Provo, which went into operation in 1924. The United States Steel Corporation became a producer of steel in the west in 1930 with the purchase of the properties of Columbia Steel. The United States Steel Company then became the only integrated steel manufacturer west of the Rocky Mountains. At the time of the war, Columbia Steel Company, then a subsidiary of the United States Steel Corporation, operated a pig iron plant at Ironton in central Utah. \(^{14}\)

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\(^{14}\) U. S. Steel, The New Industrial West, pp. 2-3.
The wartime authorization

The first serious mention of increasing Utah's pig iron capacity for the war came during the meeting of Utah's Governor H. B. Maw and Senator Abe Murdock with President Franklin Roosevelt in April of 1941. The President noted that there was an apparent shortage of steel on the Pacific Coast and that Utah was being considered for a $8,000,000 pig iron plant and a $3,000,000 steel mill. It was estimated that the plant would have a capacity of 1,000 tons per day.15

Later in the month, Senator Murdock and Henry J. Kaiser, a California industrialist, met with President Roosevelt to propose the establishment of an integrated steel industry on the west coast. Kaiser's $150,000,000 plan consisted of a pig iron plant to be located at Mount Pleasant, Utah; a steel mill in the Bonneville Dam area; and another steel mill in southern California, which would produce steel by a new production process. Henry J. Kaiser entered the shipbuilding industry with the war boom and formed the California Shipbuilding Company, which operated one of the new government-owned

15 Salt Lake Tribune, April 13, 1941, pp. 1-2.
shipyards on the West Coast. By May of 1941, he held contracts for building 54 ships in Oakland, California, and was associated with firms having contracts to build 159 ships in various Pacific Coast shipyards. His integrated steel industry was to supply steel for his shipbuilding activities. During the meeting, the President brought up the question of an adequate water supply in Utah to handle a pig iron plant. During the meeting earlier in April, President Roosevelt had expressed concern over Utah having adequate coking coal.16

Following the meeting, Senator Murdock was reported to be somewhat perplexed. It seemed to him that there was someone who was hostile to the idea of the Utah plant who also had some influence with the President. The Senator therefore sent a telegram to Governor Maw in which he stated:

Just finished conference with President and Henry J. Kaiser involving Utah pig iron plant in vicinity of Mount Pleasant. From sources unknown to me President has been informed that there isn't sufficient water available for such a plant, we must overcome this

barrier at once. Suggest State Engineer consider the matter at once and advise me at the earliest possible date officially as to availability of water. It is estimated plant will require approximately eight million gallons per day, three million gallons of which will be dissipated, remaining five million recirculated.\(^\text{17}\)

Two days later the Governor sent a telegram back to the Senator in which he stated:

State Engineer after careful analysis reports ample surface water for pig iron and steel plants five miles southwest of Mt. Pleasant on San Pitch River, also excessive amounts of water thirty-eight miles southwest of Mt. Pleasant on Sevier River. This does not take into consideration underground water supplies which natives say is of itself ample to supply needs for steel and pig iron plant. In addition there is more than sufficient water supply for plants located on Sevier River above town of Sevier and on Sevier river below the town of Mills and above Delta. There is also sufficient water on Provo River and Utah Lake in Utah County and Jordan River in Salt Lake County and Weber River in Weber County.\(^\text{18}\)

W. A. Hauck, consultant on steel capacity and production in the Office of Production Management, inspected coastal steel production in relation to existing coast defense projects, and in May 1941 stated that the normal steel consumption of the Coast did not warrant Kaiser's

\(^{17}\) Ibid.; Telegram from Senator A. Murdock to Governor H. B. Maw, April 22, 1941, Utah State Historical Society Archives.

\(^{18}\) Telegram from Governor H. B. Maw to Senator A. Murdock, April 24, 1941, Utah State Historical Society Archives.
elaborate program; that such a project could produce enough steel in 60 days to supply a year's demand; and that the flurry of shipbuilding might be over shortly after Kaiser's plants began to operate.19

Although Hauck was not for Kaiser's plan, he did estimate the adequacy of western steel mills in supplying the West Coast. He estimated that the Pacific Coast had an ingot capacity of 1,066,280 tons, and that programs underway at that time for expansion would bring this total to 1,261,200 tons by the end of 1941. He further calculated that, even with the increase in facilities, additional ingot requirements for the West Coast would total 1,115,200. It was recommended that these requirements be met by constructing two 100-ton blast furnaces, twelve 100-ton open hearth furnaces, and structural mills as thought necessary. It was further recommended that one of the blast furnaces be installed at Provo, Utah; Los Angeles, California; or Pueblo, Colorado. W. A. Hauck concluded that:

In no event should any blast furnaces be established on the West Coast by any new companies until there is positive assurance that there are adequate reserves of suitable iron ore and coking coal available

and accessible for their successful operations.\textsuperscript{20}

On the 23rd of May, the Office of Production Management rejected the plan of Henry J. Kaiser, stating that it favored the expansion of companies which were already producing steel. Governor Maw, when told that Utah would not receive the pig iron plant, declared that "the fight has only begun."\textsuperscript{21}

When the Office of Production Management, in June of 1941, asked for proposals by the steel industry for expansion, the Columbia Steel Company proposed a $63,200,000 expansion, of which the company would finance about ten percent and the government the balance. Of this total, Utah was to receive additional coke ovens, a blast furnace, an open hearth plant, bloom and slab mills, a sheet bar mill, a jobbing and sheet mill, plate mills, and a steel foundry costing $57,200,000. The proposed expansion would provide an increase in steel ingot capacity of 930,000 tons. Governor Maw, when told of this news, declared "That's great news, and what we have been working for."\textsuperscript{22}

\textsuperscript{20}Memo from W. A. Hauck to S. R. Fuller, May 15, 1941, as forwarded in letter from G. Backman to Governor H. B. Maw, July 16, 1941, Utah State Historical Society Archives.

\textsuperscript{21}Salt Lake Tribune, May 24, 1941, pp. 1-3.

\textsuperscript{22}Ibid., June 20, 1941, pp. 1-6.
One month later the Office of Production Management announced that a plan was under way to increase the facilities at the Columbia plant in Utah. The plan contemplated the allocation of $20,000,000 to the plant in order to triple the pig iron facilities and that further allocations would be made at a later date bringing the total amount authorized for the Utah plant to $57,000,000, which was the amount suggested by the company in June.  

On July 24, 1941 the Office of Production Management announced its approval of the investment of $20,000,000 for expansion of the production of pig iron in the state of Utah. The plan called for a new plant to be constructed. No official word was made concerning the location of the plant, but rumor was that it would be a lakeside location in the vicinity of Provo. The plant was to have a capacity of 1,000,000 tons of pig iron per year.  

The plans were barely completed when the Office of Production Management announced a revised plan. The Columbia plant was to be allocated $30,000,000 for the addition of three blast furnaces designed to turn out 1,004,150 tons of pig iron annually. Under the revised plan there was no mention of the production of steel.

\[23 \text{Ibid.}, \text{July 20, 1941, p. 1.}\]

\[24 \text{Ibid.}, \text{July 25, 1941, p. 1; July 28, 1941, p. 8.}\]
The addition meant a six-fold increase in pig iron production at the existing plant. The ink had barely dried on the new proposal when the government offered a newer plan. The Defense Plant Corporation reached an agreement with Columbia Steel under which the government would advance $35,000,000 for building a two-furnace pig iron plant with a capacity of 750,000 tons annually, with the probability that within 10 days or two weeks additional funds would be advanced for a third blast furnace and a mill to turn out semifinished steel.25

Finally, in November 1941, the government announced the advancement of an additional $91,000,000 for the construction of a plant to house pig iron furnaces along with one open hearth furnace to produce steel ingots and a rolling mill to turn out steel plates. The exact location of the $126,000,000 plant was not announced, but it was supposedly within a few miles of the plant at Ironton.26

In February 1942, the site of the new plant was chosen, west of Orem at the point where the Denver and Rio Grande Western and Union Pacific railroad lines met. The area extended westward to Utah Lake from the state highway and encompassed the Geneva resort as well as the homes of 37

25 Ibid., October 2, 1941, p. 1; October 22, 1941, p. 1.

26 Ibid., November 27, 1941, p. 1.
The Columbia Steel Company announced that the removal of a blast furnace from Joliet, Illinois, to Ironton was to be the extent of its expansion. Construction of the furnace started on June 5, 1942, and several coke ovens were started June 20, 1942. Construction of the facilities at Ironton was completed in April 1942.

A structural steel mill for Russia

In July 1942, plans were made for the construction of a structural mill at the Geneva plant in addition to the plane mill previously announced. In December 1943, construction of the structural unit was halted by the War Production Board. Since the Utah Oil Refining Company was constructing a high-octane gasoline refinery in Salt Lake City during a period of a shortage of construction workers in the state, the workers from Geneva were used in constructing the refinery; the aviation gasoline plant was considered to be more critical than the structural mill at Geneva.

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27 Ibid., February 9, 1942, p. 1.
28 Ibid., March 19, 1942, p. 12; May 12, 1943, p. 15.
In January 1944, there was rumor that the Russian government was interested in the mill. It was reported that President Roosevelt had promised equipment and facilities to Russia in order to increase its steel capacity. As of January there had been no return of workers to construct the structural unit at Geneva, although it was thought that the labor problem in the state had been corrected. One month later, four Russian engineers visited the plant, and their visit revived the rumor that the Russians were to receive the structural mill. Government officials denied that the government was contemplating the removal of the unit, but did admit that the matter had been discussed and negotiations had been dropped.30

By July, the structural steel mill was scheduled to begin operations on an experimental basis. In September of that year, three Russian engineers visited the plant, but it was made clear that they were contemplating the purchase of equipment similar to that at Geneva.31

Factors influencing the choice of Utah for a steel plant

There were basically eight factors influencing the construction of the steel plant in Utah. They were:

30Ibid., January 23, 1944, p. 18; February 22, 1944, p. 11.
31Ibid., July 1, 1944, p. 17; September 7, 1944, p. 13.
decentralization, transportation, labor, water, coal, iron ore, limestone and dolomite, and markets. 32

The choice of Utah as the site for decentralization purposes was based on the theory that an inland location was needed to forestall the possible loss of steel due to bombing or invasion. It was also a precaution against loss of steel shipments to the Pacific coast should the Panama Canal be closed. Transportation was conveniently adjacent to the plant, with both the Denver and Rio Grande Western and Union Pacific railroad lines converging at the plant site. 33

The Utah labor force was considered to be one of the most productive in the nation. Since the population in the state tended to be settled, absenteeism was low. In addition, Utah workers possessed a higher education than other workers in the nation, thus making training easy. 34

Water, though originally considered to be a liability, was abundant. Water was obtained from the Deer Creek Reservoir, and from artesian wells and springs located on


33 Ibid., pp. 26-27.

34 Ibid., p. 27.
the plant property. Approximately 220,000,000 gallons of water, most of it reclaimable for recirculation, was pumped through the plant daily. The average daily consumption was approximately 29,000,000 gallons, of which 9,000,000 gallons were obtained from the Deer Creek Reservoir and 20,000,000 gallons from wells, springs, and drainage.\textsuperscript{35}

Coal, a necessary mineral for production of coke, was readily accessible in the surrounding mountains. Utah Valley had access to 92,000,000,000 tons of coal reserves, some of which were within 75 miles of the plant. These reserves were largely of a bituminous and semi-bituminous character. A new coal mine was opened at Horse Canyon, some 120 miles southeast of the Geneva plant. Coal in the east central area of the state was considered to be the most important item that led to the establishment of a large integrated plant in central Utah.\textsuperscript{36}

Iron ore was so abundant in the state that it was estimated that there was at least a 75 year reserve. The iron ore mines of the Columbia Iron Mining Company at

\textsuperscript{35}"Water Recovery and Ore Bedding are Highlights," U. S. Steel News, October, 1943, pp. 6-7.

\textsuperscript{36}Holmes, loc. cit. pp. 26-31; U. S. Steel, Growth of the Iron and Steel Industry in Utah, p. 6; Utah State Department of Publicity and Industrial Development, Wartime Economic Changes and Postwar Industrial Readjustment in Utah, by J. R. Mahoney, June, 1943, p. 23.
Iron Mountain, about 252 miles southwest of the plant, were expanded in order to supply iron ore for the new steel mill. Limestone and dolomite came from properties owned by Columbia Steel Company near Payson, about 35 miles from the plant.\(^{37}\) Map 1 on the following page shows the location of the Geneva plant and the location of sources for various raw materials.

As for markets, it was estimated that the total ton-miles needed to assemble raw materials for one ton of pig iron and ship one ton of steel from Geneva to such centers of manufacturing activity as Los Angeles and San Francisco, California; Portland, Oregon; and Seattle, Washington, was shorter than from any other major steel manufacturing center in the nation.\(^{38}\)

**Construction of the plant**

The Geneva works was designed by United States Steel Company engineers and was built by Columbia Steel. The agreement made by United States Steel was that they would construct the plant without fee if they were allowed to operate the plant. If the government employed someone


Map 1. Location of raw materials used in production of steel at Geneva.
else to operate it, United States Steel would receive a reasonable construction fee. United States Steel was picked to operate the plant by the government and an arrangement was made so that the company would receive a profit equal in amount to 1 percent of the value of the material manufactured. The percentage seemed reasonable enough, but when applied to the vast volume of the plant's capabilities the profit totaled $1,000,000 a year. The government persuaded United States Steel to run the plant for no profit.39

Prior to the completion of the plant, approximately 6,900,000 cubic yards of earth were removed, 67,000 net tons of structural steel erected, 660,000 cubic yards of concrete poured, 124,000 tons of equipment and machinery installed and 117 acres of corrugated siding and roofing placed by approximately 100 sub-contractors.40

Upon completion in 1944, 252 by-product coke ovens, three 1,100 ton blast furnaces, nine 225-ton open hearth furnaces, a 45-inch slabbing and blooming mill, a 132-inch semicontinuous plate mill, a 26-inch structural mill


and numerous complementary facilities had been installed. The capacity of the plant at completion was 1,150,000 net tons of iron; 1,283,400 net tons of steel ingot; 700,000 tons of plates; and 250,000 tons of structural shapes.41

In August of 1943, the United States Steel Corporation filed articles of incorporation for the Geneva Steel Company, its new subsidiary. The new company was capitalized for $5,000,000 by the issuing of 50,000 shares of stock. Walther Mathesius, a German-born steelmaker who had proposed as early as 1935 that Utah be chosen for a steel plant, was made President of the newly formed company.42

In December 1943, the first of four batteries of coke ovens, each containing 63 ovens, was placed in operation. In January 1944, the first of three blast furnaces was "blown in" approximately 20 months after an army of contractors moved onto the site and began rooting up orchards and gardens. One month later, the first of nine open hearth furnaces went into operation.

41 Holmes, loc. cit., p. 23.

At the end of February, the first slabs of steel were rolled in the huge rolling mill at the plant. By April, the first steel plate from the plant was sent to the West Coast shipbuilders. The shipment consisted of five carloads totaling 600 tons of steel plate.43

Employment at Geneva

Approximately 10,000 men were employed to construct the plant. Many of these were from surrounding towns, but others had to be brought in from outside the state. To house single men, ten 105-man single-room barracks and two 295-man double-room barracks were constructed on the plant site. To accommodate families, the Federal Public Housing Authority supplied about 800 trailers.44

There was no resentment at first, except possibly on the part of the Mormon Church, which did not like the idea of a big industry intruding on the peace of the valley. But resentment began when stories of neighbors having to leave farms their grandfathers had pioneered started to get around. And when it became necessary to import men from other counties and other states to fill out the construction crews, the resentment grew stronger.45

As for the people of Provo:


44U. S. Steel News, p. 5.

45Murray Moler and Andre Fontaine, "Utah's Steel Guinea Pig," Collier's, December 30, 1944, pp. 11-12.
They didn't like the trailer camp that sprang up near Geneva, and some of them were unhappy about the tremendously increased business the beer parlors in Provo were doing. They objected to the sudden over-crowding of everything from stores to homes. They resented the sudden, mushroom growth of near-by American Fork, Pleasant Grove, Lehi and Orem.  

Operations at the plant began officially in November, 1943. By February 1944, employment stood at 1,500 and then advanced to 3,000 by May 1944, and a maximum of approximately 4,200 was reached in January of 1945. It declined to 3,000 by VJ-day and to 1,000 in December 1945. As for the type of employees, it was noted that they're farmers first and steel men second. When the fruit crops are ripe they go back to their farms for the harvest. Steel, they say, can wait; fruit can't. 

Production at Geneva Steel

During the period that Geneva Steel was operated by the government, more than 850,000 tons of iron were produced.

46 Ibid.
From February 1944 to November 1945, the plant produced 634,010 tons of plate, and 114,280 tons of structural shapes.48

Postwar Status of Geneva Steel

With the surrender of Japan in August of 1945, the cancellation of wartime contracts for shipbuilding and other war projects brought an end to the emergency need for Geneva. The plant gradually slowed to standby operations while postwar disposal plans were negotiated.49

In February 1945, officials of the United States Steel Corporation advised the government that they were interested in purchasing or leasing the Geneva plant for postwar operation. Opposition to the sale of the plant to United States Steel developed in some government circles on the charge that the company was attempting to monopolize the market. There was also some doubt about the successful operation of the mill in peacetime in view of the size of the facilities. Colorado Fuel & Mines also bid on the plant.50

48 Myron E. Strate, op. cit., pp. 3-4.
50 Salt Lake Tribune, February 6, 1945, p. 1; Growth of the Iron and Steel Industry in Utah, p. 7.
In July 1945, the Board of Directors of United States Steel decided to take no further action toward the acquisition of the Utah plant. In a letter to Sam H. Husbands, president of the Defense Plant Corporation, the Board stated:

After full consideration of the whole situation, including the various problems which seem to us to be involved in attempting to establish the Geneva mill after the war as a sound and successful commercial enterprise, the Directors of United States Steel Corporation have decided that no further action to acquire the Geneva plant be taken.51

The question of postwar disposition of Geneva was a problem to the government. In 1945, a special Senate hearing was held concerning the disposal of wartime iron and steel plants, although the hearing revolved around Geneva. In that hearing, E. Perry Holder, president of Colorado Fuel and Iron Corporation, said:

I feel that Geneva is 20 years ahead of its time through circumstances of war.

Under no circumstances would Geneva have ever been built, I believe, if it were not for a war; but it was built, it is there, and it is a problem to us. That is a steel business of over 1,000,000 tons in a town of 75,000 population. There isn't another single, individual steel operation like that,

I believe, in the country that is as far from population, or has that scattered population, in the United States.52

More on the philosophical side, but a nonetheless important statement, was made in that same hearing by Henry J. Kaiser, of the Kaiser Company, who said:

I think there seems to be two main schools of thought regarding the disposition of surplus government property.

One represents the point of view that all Government-owned war plants should be closed so as to prevent their being used in competition with prewar enterprises.

A second school of thought proclaims that every Government war plant and all Government-owned supplies should be employed as fully as possible.

The disposal of the Government-owned steel mill at Geneva, Utah, sharpened the contrast between these two opinions, and therefore becomes an issue of social as well as economic import. In fact, we are in the presence of a conflict of opinion as to the nature of social and economic justice in which the whole world is involved.53

The government later allowed United States Steel to bid on the plant, and in May, 1946, the War Assets Administration accepted its bid of $47,500,000 and a pledge to

52 U. S. Congress, Senate, Hearings, War Plants Disposal—Iron and Steel Plants, pp. 16-17.

53 Ibid., p. 25.
spend $18,000,000 for reconverting the plant to peacetime production. On June 17, 1946, Attorney General T. C. Clark approved the sale to United States Steel. Private operation of the plant began two days later. In the fall of 1946, all the Utah operations of United States Steel were consolidated under the management of Geneva Steel Company with the exception of the iron mines which were operated by Columbia Iron Mining Company.54

To many survival of the Utah steel industry, just as its birth, depended upon the wartime economy. The absence of federal financing and accelerated tax amortization would mean the death of the huge Utah plant. But it was soon pointed out that this analysis was not correct. From the viewpoint of raw materials cost, the furnaces at Geneva were as efficient as the furnaces at older locations such as Chicago and Pittsburgh. In fact, of all major pig iron producing facilities in the country, Geneva's raw materials cost was the least.55

54Salt Lake Tribune, June 18, 1946, p. 1; Growth of the Iron and Steel Industry in Utah, pp. 7-8.

Importance of the Geneva Steel Plant

During the War

Geneva was the most important wartime development in Utah. Approximately $190,000,000 was spent for the Geneva plant out of $311,000,000 in new industrial facilities authorized during the war for the state. About 70 percent of Utah's wartime industry is accounted for by the Geneva plant and the Columbia plant at Ironton. Utah's industrial development during World War II would have amounted to only $93,000,000 of new facilities had it not been for the expansion of steel and pig iron facilities in the state.

The Geneva plant was the first plant utilizing a natural resource that was authorized for Utah and had any postwar significance. More than just a productive source in itself Geneva's effect was multiplied throughout the Utah economy by utilizing the state's natural resources more than any other plant built during the period 1940-1945. The Geneva plant proved that an area did not necessarily have to be heavily industrialized in order to succeed in producing successfully. Utah proved up to the challenge of such a basic industry as steel production.

As for the influence of Geneva on the changing industrial West, of the 1,966,000 tons of finished steel
products consumed in the seven Western States during the year 1930, 23 percent was produced in the West. During 1940, 26 percent was produced in the West. In 1950, however, of the 5,000,000 tons consumed in the West, 61 percent was produced in Western steel mills. Geneva steel mill played no small part in this change.56

CHAPTER V
VARIOUS STEEL-RELATED FACTORIES

Wartime Development of Utah's Vanadium

Introduction

Another mineral resource of Utah around which a manufacturing industry was built during the war was vanadium. As with alunite, the development of vanadium probably would not have been attempted on the scale it was had it not been for the war; the success of Utah's vanadium industry has depended upon wartime markets and the postwar era of the Cold War. The Bureau of Mines estimated that the deposits of vanadium in Utah would not have had any commercial value had it not been for special arrangements made with the government for its production.1

In relation to most of Utah's wartime industry, the plants built to produce vanadium were significantly different from other plants constructed in Utah at that time. As the national expansion of industries, most of Utah's factories were located in areas already industrialized and more heavily populated. The vanadium plants built in Utah

were departures from the typical practice of locating factories in the Wasatch Front. By being built in the southern part of the state near available resources, the vanadium plants were unique wartime factories.

Development of Vanadium in America

The principal use of vanadium is in the manufacturing of high-speed low-alloy tool steels and high-strength cast iron and steel forgings. Demand for vanadium during the war was reflected in the increased use of vanadium-bearing steels, which had been substituted for steels containing nickel and tungsten. Foreign armament programs were responsible for increasing the demand for vanadium. The mineral had been confined by government order to defense purposes early in the armament program, and in December 1941 was placed under the control of the Metals Reserve Company, a subsidiary of the Reconstruction Finance Corporation. All vanadium produced in the United States from December 1941 to February 1944 was sold to this government agency for war purposes.²

American vanadium companies. The center of American vanadium ore is in an area encompassing Colorado, Arizona, New Mexico, and Utah—what is commonly called the Colorado

Plateau. The Colorado ores were originally mined about 1900 by Joe and Mike Flannery. The brothers first worked the deposits for radium, but later became interested in vanadium—in Peru, rather than in Colorado.³

Until 1919, the Flannery family controlled the world production of vanadium. It is significant also that more than 90 percent of the world production of the ores in 1929 were under American industrial control. In 1919, the Flannery's sold their vanadium properties to C. M. Schwab and J. L. Replogle, steel industrialists. Schwab and Replogle formed the Vanadium Corporation of America, which became the major developer of Peruvian deposits. The vanadium in Peru was extracted from patronite, the natural sulfide of vanadium, and for a long time this ore contributed 60 percent of the world's vanadium recovered from ores.⁴

The first effective challenge to the Vanadium Corporation of America came in 1926 when the Union Carbide company acquired the United States Vanadium Company, a firm producing vanadium from ores in Colorado. The name of the company was later changed to the United States Vanadium Corporation. This company operated plants at Uravan and

Rifle, Colorado.\textsuperscript{5}

The Colorado and Utah deposits. The principal ore of vanadium in the Colorado-Utah region is carnotite. These deposits, representing a distinct type, are found disseminated in spots, bunches, and seams. Deposits are also found in northeastern Arizona and northwestern New Mexico. The area in which they occur includes approximately 10,000 square miles.\textsuperscript{6}

Although it was not recognized as such, carnotite was known to exist in the sandstones of western Colorado as early as 1880. About 1898, its commercial importance as a source of vanadium, uranium, and radium was established. The carnotite ore was found in San Juan County, Utah in 1898 and the first shipment of the Utah ore was made to Buffalo, New York in 1904. In 1910 and 1911, several large companies held properties in the two-state region and began shipping carnotite ore to radium extraction plants in France. By 1946, the largest holdings in the region were controlled by the United States Vanadium Corporation and the Vanadium Corporation of America. The Vanadium

\textsuperscript{5}Ibid. 

\textsuperscript{6}Minerals Yearbook, 1941, p. 635; Exploration of Vanadium Region of Western Colorado and Eastern Utah, p. 1.
Corporation of America controlled approximately 300 claims in San Miguel and Montrose Counties, Colorado, and San Juan County, Utah.\textsuperscript{7}

The discovery of richer and more cheaply mined pitchblends ores in the Belgian Congo in the early 1920's left the Colorado-Utah deposits without economic importance as a source of radium and uranium, and in 1923 the area became inactive. The rising demand of the alloy-steel industry for vanadium renewed interest in the deposits. By 1938, vanadium production in the area had achieved respectable proportions and new impetus was given to it at the entry of the United States into World War II. In order to meet the requirements of war, new plants were built in Durango, Colorado, and Monticello, Utah, in addition to the opening of new vanadium mines and the preparation of older ones for production.\textsuperscript{8}

\textbf{Vanadium production in Utah}

Prior to entry of the United States into the war, Utah had produced some vanadium. In 1939, more than 189,000 pounds of vanadium were shipped from Grand and San Juan

\textsuperscript{7}Ibid., pp. 1-2; Utah Mining Association, Utah's Mining Industry, 1959, p. 75.

\textsuperscript{8}Exploration of Vanadium Region of Western Colorado and Eastern Utah, pp. 3-4.
counties, with the largest shipment coming from the Shumway property near Blanding.9

In August 1941, vanadium was placed under full priority control. During a meeting of the Supply and Priorities Allocations Board in November of 1941, W. L. Batt and P. D. Reed, both members of the Board, commented on the supply and demand problems in connection with vanadium. Since estimates that direct and indirect defense requirements in 1942 would exceed supply, they pointed out that close control of the metal would be necessary.10

During 1941, the Vanadium Corporation of America maintained an ore sampler at Monticello, where ore was purchased and stockpiled. In November, the government approved $725,000 to the company for the construction of a mill in Monticello. Of this total, $193,000 was for the site and buildings, and $532,000 for machinery and equipment. The plant, owned by the government and operated by the company, was to produce vanadium pentoxide for use in tool making.11

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9 Minerals Yearbook, 1940, p. 634.

10 Salt Lake Tribune, August 17, 1941, p. 4A; U. S. Civilian Production Administration, Bureau of Demobilization, Minutes of the Supply Priorities and Allocations Board, 1941, p. 23.

In December 1941, announcement was made that the plant would start production about July 1, 1942. The cost of the plant was then reported to be $1,000,000, while ultimately the cost reached $1,290,000. It was estimated at the time that 98 percent of the pure ore produced at the mill was to be shipped to Bridgeville, Pennsylvania for refining. The plant was slated to employ about 700 men and would require 6,000 gallons of oil daily to fire the roasting ovens and generate electricity. It would also require about 4,300 pounds of salt per day and five tons of sulfuric acid a month.12

The Blanding mill. In June 1942, a fire destroyed a vanadium mill which had been operated by the Blanding Mines Company. The fire in the mill caused more than $25,000 worth of damage. In March 1943, the mill had been reconstructed and had started operations again.13

The new mill processed ore from mines leased in the Cottonwood district, 14 miles southwest of Blanding. Concentrates from the mill were trucked to Montrose, Colorado for shipment east by rail. The new plant cost $70,000, all of which was financed publicly, and had a

12Ibid., December 19, 1941; p. 21; U. S. Civilian Production Administration, War Industrial Facilities Authorized, July 1940 to August 1945, pages not numbered.

13Salt Lake Tribune, June 26, 1942, p. 8; March 14, 1943, p. 9B.
daily capacity of 25 short tons.  

Production at Monticello. By November 1942, the plant at Monticello was working around the clock. Two townsites had been constructed for the plant. One was comprised of 19 houses and a staff house for the staff force. The other consisted of 32 houses. Both had been constructed by the Defense Plant Corporation. Since the construction of the plant, the population of San Juan County had increased by more than 600 persons.  

In December 1942, the mill began operating at a daily capacity of 100 tons. At that time 260 men were employed at the plant. Much of the mining of the ore was done in Navajo Indian country, where 90 percent of the employees at the mines were Navajos.  

During 1942, 1,075,596 pounds of vanadium were produced in Utah, and 833,680 pounds were produced in 1943. In February 1944, however, the Metals Reserve Company terminated its program of purchasing vanadium. On February 6, 1944, the plant at Monticello was closed. The govern-

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15 Salt Lake Tribune, November 15, 1942, p. 14B.  
16 Ibid., December 20, 1942, p. 14B.
ment claimed that the 1,000,000 pounds of vanadium pentoxide on hand was sufficient for the duration of the war. In spite of the cutback domestically, Peruvian imports of the metal remained high throughout the year. 17

In contrast to the 216 operators who reported production in 1943, only 82 were known to have shipped in 1944, and more than half of these shipped to the Metals Reserve Company only during the first two months of the year. The responsibility for maintaining a domestic vanadium industry reverted to the United States Vanadium Corporation and the Vanadium Corporation of America. 18

In February 1945, the Monticello plant was reopened when the Vanadium Corporation of America purchased the Monticello stockpile and leased the plant from the government. The company then planned to rehire 60 men to work the plant. During 1946, the Monticello plant completed refining of ores purchased from the Metals Reserve Company and various other sources. The plant was shut down at the end of 1946. 19

17 Minerals Yearbook, 1944, p. 79; 1943, p. 664; 1944, p. 642; Salt Lake Tribune, February 6, 1944, p. 10B; December 24, 1944, p. 7B.


19 Ibid.; 1946, p. 1235; Salt Lake Tribune, February 27, 1945, p. 11.
Postwar use of the Monticello plant

The vanadium plant at Monticello was advertised for sale by the government in May 1947. The Vanadium Corporation of America, wartime operator of the plant, bid $85,000 for the machinery, equipment and 17 buildings of the mill, but did not bid on either townsite. In August, the War Assets Administration turned down the bid. The company indicated a desire to tear down the plant and sell the materials. The government, it seemed, wanted the plant kept intact. One reason for this, of course, was that the government had become interested in carnotite as a source of uranium. In 1947, the Atomic Energy Commission declared that it was their policy to:

purchase ores for its program from private sources and limit direct Government production as far as possible. It is desirable, however, for the Commission itself to carry on certain activities for the purpose of determining the most efficient methods of ore extraction and beneficiation.20

In December the Atomic Energy Commission bid $143,324 for the plant which it said it wanted on standby condition for the possible production of uranium. Later in the month, the War Assets Administration approved the bid, and

the plant was sold to the Atomic Energy Commission, which reconverted the plant to the production of uranium from carnotite.21

Significance of vanadium production in Utah

Carnotite—the ore found in the Colorado Plateau of Utah, Colorado, Arizona and New Mexico—has been processed for radium, vanadium, and uranium. Each of the three metals has been produced at one time or another in the region, but each has held primary interest during distinct and separate intervals of time. During the known existence of the ore only one of the processed metals has played a major role, while the other two played minor roles. There are basically three periods of time in which one of the three products of carnotite ore held special interest to processors. They are: radium, 1898 to 1922; vanadium, 1935 to 1947; uranium, 1947 to present.

The principal use of radium was therapeutic, its chief application being in the treatment of cancer and skin diseases. The carnotite ores of the Colorado Plateau were mined primarily for radium until 1922, when a lull was induced by competition from the radium found in the

Belgian Congo. Uranium and vanadium were produced, but both were byproducts.22

From 1935 to 1947, the ores were processed primarily for vanadium. During 1935, the output of carnotite ores from the Colorado Plateau amounted to 1,145 short tons valued at $56,223, containing 3,329 milligrams of radium, 22,009 pounds of uranium, and 50,776 pounds of vanadium. In 1936, the United States vanadium producers processed 139,512 pounds of vanadium ores and concentrates. By 1943, 5,586,492 pounds were shipped, all of which came from the Colorado Plateau. In 1941, the United States displaced Peru as the leading producer and increased its lead in 1942 by supplying over 50 percent of the total world output. The demand for uranium at the beginning of the war so small that only 13,000 tons were classed as uranium ore.23

It was not until the development of the atomic bomb during World War II that the ore became important as a source of uranium. In 1947, the Atomic Energy Commission reported that up until then uranium had come predominately from certain foreign countries whose uranium deposits were richer than any found in the United States. No production


of uranium from the United States other than the
recovery of by-product uranium from the vanadium industry
of the Colorado Plateau was feasible during the war.

The Commission believed that:

In the field of raw materials, . . . the
Commission now must plan for the indefinite
future in which the requirements of national
defense and of peacetime industrial applica-
tions of atomic energy will bring unpredict-
able demands for uranium ores.24

By 1953, uranium production became the primary pro-
duct of the carnotite ore in the Utah-Colorado region.
In that year, the vanadium industry was one of the smaller
ferrous metal industries, ranking last in production and
second highest in price among the eight major alloying
metals. Nevertheless, vanadium production in Utah had
continued in the postwar period. In 1947, the produc-
tion of vanadium in the state hit a low of 48,949 pounds.
By 1954, 1,077,806 pounds were produced, which was
2,000 pounds more than the production in the peak war
year of 1942. But the production of vanadium in the post-
war period was different than that carried on during the
war.

24 The Third Semiannual Report of the United States
Atomic Energy Commission, p. 3.
Since entry of the Atomic Energy Commission into the carnotite region of the Colorado Plateau for the purpose of obtaining uranium by far the greater part of the vanadium production in the United States became a byproduct or coproduct of uranium. Previously, vanadium production in the United States resulted in byproduct uranium.25

The vanadium industry in Utah was launched during the war, and was maintained in the postwar period of the Cold War. The demand for uranium in the postwar period, however, overshadowed the demand for vanadium. The extraction of vanadium from carnotite in Utah became of secondary importance to a new Utah industry.

The Tungsten Re-treatment Plant

Introduction

In addition to producing vanadium for America's steel-tool industry during the war, Utah produced tungsten, which is used also as a steel alloy. As was true for vanadium, the demand for tungsten was directly related to the increased production of steel tools during World War II.

The Salt Lake City tungsten plant was significant because it was one of only two plants in the country

which used a chemical process rather than the conventional concentration-flotation method to produce tungsten. The other plant was located in Nevada. The Utah plant provided a market for low-grade tungsten producers in Utah and was instrumental in the production of over 5,000,000 pounds of usable tungsten during the war.26

Development of the tungsten resource

The chief use of tungsten, as with vanadium, is in the manufacturing of cutting tools, the majority of which are made of high-speed steel containing about 18 percent tungsten, 4 percent chromium, and 1 percent vanadium. Tungsten was first used about 1758 by A.F. Cronstedt, who applied the term tungsten (Swedish for "heavy stone") to the mineral because of its high density. The first important use of tungsten commercially was in a tungsten-manganese steel which hardened upon air cooling from proper heat-treating temperatures. The most notable achievement in the field of tungsten steels was the development of the composition known as high-speed steel. This product was received with great enthusiasm when it

was first exhibited by the Bethlehem Steel Company at the Paris Exposition in 1900. 27

During World War I, demand for American tungsten increased in countries whose supply was cut off from Germany. The production of ores, concentrates, and high-speed steels all greatly increased in the United States during this period primarily because of defense activity. In preparation for World War II, the stockpiling of tungsten by the government was initiated under the Strategic Materials Act signed by President Franklin Roosevelt on June 7, 1939, which authorized the expenditure of $100,000,000 over a 4-year period for the purchase of strategic materials. 28

Early development in Utah

The first tungsten shipped from Utah was a by-product from the Continental-Alta mine in Little Cottonwood Canyon in 1905. In 1916, a mill at Eureka treated 1,726 tons of ore from the Deep Creek region. Tungsten was also discovered in that same year near Linwood, in Uintah County. In 1918, a few tons of tungsten were shipped from near Lucin in Box Elder County, while in 1937, the Star Dust mines shipped 22 tons of tungsten concentrate.

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28. Ibid., I 3-4.
from the Gold Hill District in Tooele County. Miners had been walking over tungsten ores and throwing it on the dumps for years and "had it not been for the threat of war, plus new techniques, they might be passing up very vital deposits." 29

Construction and operation of the Utah plant

In April 1942, it was announced that the Defense Plant Corporation had advanced $350,000 for the construction of a tungsten mill in Salt Lake City. The United States Vanadium Corporation was picked as the operator of the plant, which was located at 5th West between 7th and 8th South in Salt Lake City. The plant was designed to utilize a process which had been developed by the United States Vanadium Corporation in 1938. Before the company developed its chemical process, considerable tungsten was lost in middlings (the milled material between the high-grade concentrated and the tailings). The usual selective flotation concentration process produced a concentrate running around 60 percent tungsten, while the chemical process of the United States Vanadium Corporation produced an equally-high tungsten content from low-grade millings. The Salt Lake refinery treated

29 Salt Lake Tribune, May 23 1942, p. 29.
intermediate flotation concentrates which were too low-grade to be marketed otherwise. The plant did not receive crude ore direct from mines, but treated concentrates only.30

In order to induce small producers of tungsten ore to begin or increase the production of the ores, the Defense Plant Corporation initiated two programs. In August of 1942, the United States Vanadium Corporation announced that ore containing 1 to 3 percent tungsten would be purchased in small quantities and stockpiled at the Salt Lake plant. It was the first time tungsten mines were able to sell low-grade ore in small lots. In addition, during November of that same year the government raised the price of lower grade tungsten and concentrates from $24 to $30 per dry short ton, but only for those producers who produced less than 100 tons in 1942. Although the program of price supports to smaller producers was originally intended to run for one year, it was continued until December 1944.31

In April 1943, the Salt Lake plant began operations. The stockpile of ore at the plant was sent to the

30Ibid., April 17, 1942, p. 17; April 21, 1943, p. 22; May 7, 1942, p. 13; May 24, 1942, p. 12B.

Segerstrom mill near Milford for concentration. Most of the ore which was ultimately used at the treatment plant came from the Desert Mine in Juab County; Star Dust and Traction Lode mines in Tooele County; Scheelite Queen in Millard County; Lone Pine Mine in Box Elder County; and the Garret Mine in Beaver County. From April 1943 to the end of the year, the plant processed 13,370 short tons of concentrates. The Bureau of Mines reported that:

Chiefly as a result of bringing into operation the re-treatment plant of Metals Reserve Co. at Salt Lake City, Utah, and greatly increased output at the Yellow Pine Mine in Idaho, production of primary tungsten concentrates in the U. S. gained 28 percent over 1942 to reach an all time high of 12,045 short tons in 1943.32

In April of 1944, operations were suspended at the plant in Salt Lake City. During the four months that it had operated in 1944, the plant treated 6,870 tons of concentrates. One year later, the plant reopened and during its operation in 1945 handled 8,658 tons of concentrates. The plant finally closed down during the third quarter of 1946. During its 1946 operations it treated 5,805 tons

of concentrates. During the periods of operation between the years 1943 to 1946, 34,703 tons of concentrates were processed at the plant.\textsuperscript{33}

Postwar use of the plant

In April 1947, the plant was advertised for sale by the government, and three concerns bid for the structure. They were: The Structural Steel and Forge Company of Salt Lake City, $81,400; Morse Brothers Machinery Company of Denver, Colorado, $74,743; and the Pamil Corporation of New York City, $75,137. In May, the War Assets Administration approved the bid of the Structural Steel and Forge Company. The company later dismantled the plant and rebuilt a structural steel plant on the site. Thus, although the government-built plant was dismantled, the site was used for the construction of a plant which used primary steel from Geneva Steel Company to produce structural forms.\textsuperscript{34}

Utah's Industry Behind the Industry

Introduction

One of the affects of Geneva Steel was the construction by the government of a refractories plant at Lehi.

\textsuperscript{33} Minerals Yearbook, 1944, p. 661; April 15, 1945, p. 3B; 1946, p. 1198.

\textsuperscript{34} Salt Lake Tribune, April 29, 1947, p. 16; May 29, 1947, p. 13.
It was evident at the time that a large steel plant such as Geneva would require refractories for its construction and maintenance. The Lehi refractories plant was built specifically for supplying refractories to the steel and iron plants in Utah County.

Refractories during World War II

When the United States entered World War II, refractories emerged from a state of semi-hibernation to meet requirements of a newly-awakened industrial America. Industry had subsisted from 1930 to 1940 on a limited scale, but the war greatly heightened the demand for refractories. In 1940, 1,800,000 insulating firebricks were consumed in the nation, while in 1942, that figure had climbed to 8,000,000.35

Though the refractories industry, as with the machine-tool industry, was one of the first to feel the pressure of arming, no strict War Production Board controls were ever applied. In 1942, when the industry reached its all-time peak in allowing steel, aluminum, magnesium, and other war plants to go into production, it was operating at 94 percent of capacity. In 1944, it was down to 70 percent of capacity, although war production was rolling

35 "Earn a Corner in Every "E" Flag," Brick and Clay Record, January 1944, p. 25.
at full speed. In 1939, there were 211 establishments which were classified in the refractories industry, of which 46 were non-clay and 165 were clay refractories establishments. By 1947, there were 265 establishments classified in the refractories industry, or an increase of 54 establishments. During the war, two refractories plants were built by the Defense Plant Corporation. One of these—the Lehi refractories plant—was built to supply silica bricks to Utah's newly acquired steel industry.36

Development and use of refractories

Ancient Egyptians are credited with the first use of refractories, since the oldest known pyramid was erected near Cairo of sun-dried clay brick. Burned clay bricks were made in Chaldea, and burned silica brick was used in the construction of the palace of Darius. In America, Spanish conquistadores found natives of Mexico, Peru, and Arizona quite proficient at the art of brick-making.37

In the middle of the 18th century, common brick-making methods and special fire-clays were joined in a process that produced firebrick. This joining signalled the birth of the modern refractories industry. What is


believed to be the first exclusively firebrick plant in America was built in upper New Jersey in 1812, and this was followed by another in 1825. The first silica brick was made in the United States in 1866 in Akron, Ohio, although this brick did not find wide use until its introduction in the open hearth furnaces in 1855. The halting of the importation of magnesite during World War I necessitated the discovery of domestic sources of refractories material. New deposits of magnesium were found in the Far West, and Missouri was recognized as a source of diaspore clay used in the production of refractories. Ever since World War I, the United States has been largely independent from use of foreign sources for refractories material.38

A refractory is a heat-resistant clay and mineral product, the prime function of which is to provide the structure of furnaces that heat, melt, or generate. Broadly speaking, any material that can be heated slowly to 1500 C (2732 F) without showing obvious signs of fusion may be classified as a refractory. There are as many as six different types of refractories. These are: fireclay bricks, high alumina bricks, silica brick, basic brick, insulating brick, and plastic refractories. In addition,

38 Ibid., pp. 10-15.
certain types of cements and mortars are classified as refractories.39

In 1936, there were more than seven industries which depended upon refractories, the most important of which was the steel industry, which consumed nearly 50 percent of all refractories produced in that year. Since nearly all equipment for the production of ferrous materials requires refractories, the steel industry and refractories industry are interdependent and have been closely associated. Refractories are needed to form the gigantic ovens in which coal is converted to coke. They are used in blast furnaces and in the hot blast stoves, which are used to heat the air supplied to the blast furnace. Refractories are also used in cupolas or reverberatory furnaces, soaking pits, reheating furnaces, forging furnaces and annealing furnaces. Blast furnaces alone consume 33 percent of all refractories.40

The refractories plant built in Utah during the war was designed to produce silica brick, the raw material of which is quartzite or ganister. This mineral is a hard,


dense, and comparatively uniform rock composed almost entirely of silica. The principal deposits of ganister are scattered throughout the country and include the state of Utah.41

Operation of the Utah plant

In July 1942, construction started on the refractory plant at Lehi. Some of the smaller structures had been built, but the construction of the larger buildings began during the last part of July. The cost of the plant was then estimated to be $250,000, although ultimately it reached $625,000. Gladding McBean and Company, from Los Angeles, California, was chosen to operate the factory, which was expected to employ 75 men. Prior to the construction of the plant, refractories were shipped to the Ironton plant from California.42

Production figures of the Lehi plant are not available, but between 1941 and 1942, the supply of refractory stone in the United States increases from 2,254,000 pounds to 2,718,000, but decreased in 1944 to 2,707,000 pounds. In 1944, quartzite sold for the manufacture of silica brick

41 Refractories, pp. 24-26.
42 Salt Lake Tribune, July 26, 1942, p. 13A; War Industrial Facilities Authorized, pages not numbered.
dropped 23 percent in quantity and 18 percent in value from the year 1943. In March of 1944, the Lehi plant was closed due to an adequate supply of bricks for the iron and steel plants in Utah County.43

In July 1946, the 14-acre plant was advertised for sale and in September of that year the War Assets Administration sold the plant to the General Refractories Company of Philadelphia, Pennsylvania, one of the five largest refractories producers in the nation.44

Postwar status of the Lehi plant

It was known that the refractories industry would face problems in the postwar period, partly due to improvements made by the industry itself. Fortune stated:

In some industries refractories last twice as long as they did twenty-five years ago. This progress has created problems for the industry. Normally about 90 per cent of refractories are used for replacement, only 10 per cent for new installations. As refractories get better replacement sales decline.45

The refractories industry during the last year of the war, however, believed:

It can be fairly assumed that refractory production will be greater than 110% of the 1925-26 level and will be nearer the 150% of that level even if the biggest user, steel, should take an extreme drop to 70 million tons of ingot steel. Then refractories may remain at about 135 to 140% of the 1925-26 level. 46

With the successful operation of Geneva Steel in the postwar period, General Refractories maintained the plant into the 1960’s in order to supply refractories to Utah’s wartime steel facilities.

CHAPTER VI
THE UTAH OIL REFINERY DURING WORLD WAR II

National Expansion of Oil Refining Capacity

One of the most vitally needed wartime products was high-octane gasoline. Defense aircraft required a gasoline which possessed a high antiknock quality not then available in conventional gasoline. Research in techniques to produce a high quality gasoline was accelerated in the latter part of the 1930's. In 1937, the first commercial catalytic cracking plant in the nation went "on stream" at Marcus Hook, Pennsylvania. In the fall of 1939, newer refining processes, particularly catalytic cracking, alkylation, polymerization, catalytic reforming, and hydrogenation began to appear. Advertising campaigns introduced new "super" motor fuels which possessed high antiknock qualities. Sun Oil announced its Nu-Blue Sunoco, which was heralded as a new miracle of gasoline chemistry. Nu-Blue claimed quick starts, economical mileage, and high antiknock qualities. Later, Socony-Vacuum, Standard of New Jersey, Shell, and other companies introduced new "super" fuels with high antiknock ratings.¹

As the danger of war approached, President Franklin Roosevelt took steps to organize the petroleum industry into a unified supplying force for the armed forces, industry, and civilians. In May 1941, he created the Office of Petroleum Co-ordinator for Civilian Defense and appointed Secretary of the Interior Harold L. Ickes to head the agency. The Office was later changed to the Office of Petroleum Co-ordinator for War, and even later to the Petroleum Administration for War. In November of 1941, Petroleum Co-ordinator Ickes appointed 78 leaders from all branches of the industry to the Petroleum Industry Council for National Defense.2

An unprecedented amount of government control was placed over the industry when prices of crude oil and most of its products were frozen under the Emergency Price Control Act. Control of production quotas, normally a function of the several states, was brought under the control of the federal government under the auspices of Secretary Ickes.3

The Utah Oil Refinery in Salt Lake City was one of numerous refineries in the country which were expanded

2 Standard Oil Company (Indiana), pp. 606-607; Petroleum Facts and Figures, p. 3.

3 Standard Oil Company (Indiana) p. 607.
or built to increase production of vitally needed high-octane gasoline. The $15,000,000 expansion of the Utah refinery was one of the most important wartime facilities built in the state. Its significance is most noticeable when compared with the Kalunite plant built during the same period. While the authorization for the construction of the Kalunite plant required a great deal of political lobbying, the Utah Oil Refinery obtained authorization for expansion without much "politicking" and with little publicity or notoriety. Moreover, the Kalunite plant received a great deal of attention both by the Bureau of Mines and the Office of Production Management, in addition to several Congressional committees. Articles in periodicals and newspapers concerning the Kalunite plant were frequent both during and following the war. The Utah Oil Refinery, on the other hand, failed to receive any substantial amount of publicity until the plant was practically constructed and ready for production, in spite of the fact that only three other plants authorized in the state by the government during the war cost more (Geneva Steel plant, Columbia Steel plant, and the Remington Arms plant). In contrast with the unsuccessful Kalunite plant, the Utah Oil Refinery plant was successful and received national recognition for achieving a unique production record. Finally, the refinery was sold in the
postwar period and continued to produce a product similar to the one it was designed for during the war.4

Wartime Expansion of the Standard Oil Company of Indiana

The expansion of the Utah refinery was part of the wartime program of expansion by the Standard Oil Company of Indiana, of which the Utah Oil Refinery Company had been a subsidiary since 1921. Standard attempted to find new and more efficient ways to meet the demand for higher quality gasoline. In 1941, about 65 percent of Standard's research expenditures were applied to projects directly or indirectly connected with national defense. In December of 1941, Standard announced that it had developed a new process for manufacturing aviation gasoline. The new process was called "naptha isomerization," or better known as the isomate method. Prior to the development of this process, it had taken about 65 percent iso-octane and 35 percent base blending stocks plus tetraethyl lead to make 100-octane gasoline. Under this new process it was now possible to make 100-octane gasoline by using only 40 percent iso-octane and 60 percent base.

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4U. S. Civilian Production Administration, War Industrial Facilities Authorized, July 1940 to August 1945, pages not numbered.
The process not only saved on synthetics used, but the amount of 100-octane fuel which could be produced from this new blending was increased 50 percent.  

Standard's refineries were operating at capacity during 1941, and all previous records for crude runs were broken as 112,562,112 barrels were processed. Standard embarked in 1941 upon a $90,000,000 program to convert old refining units and construct new ones for wartime production. Between the months of June 1940 and July 1945, Standard Oil Company of Indiana received authorizations for over $110,000,000 in facilities, of which only $28,000,000 was financed publicly. By 1944, Standard had a daily capacity for manufacturing approximately 1,150,800 gallons of 100-octane gasoline, which was more than was produced daily by the entire petroleum industry before Pearl Harbor.

When the war ended, Standard's refineries were shipping enough aviation gasoline every day to fuel more than one million miles of flight by B-29's.  

The Utah Oil Refinery Expansion

The Utah Oil Refining Company was incorporated in June of 1909 in Salt Lake City and had been refining crude

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5 Standard Oil Company (Indiana), pp. 611-612.
6 Ibid., pp. 609-620.
petroleum for over 30 years prior to World War II. In 1909, a plant was constructed by the company on a quarter-acre lease on a railroad right-of-way. The seven-barrel-capacity plant was erected to manufacture oil and grease.

Among the early disappointments and obstacles that beset the new enterprise were two disastrous fires which almost completely destroyed the plant. But in later years the officials of the company came to look upon those fires as blessings in disguise, for they necessitated rebuilding the plant, a rebuilding which in both instances was upon bigger and better scale.7

In 1917, the Midwest Refining Company obtained a 50 percent interest in the Utah company. Four years later the Standard Oil Company of Indiana acquired ownership of the Midwest Refining Company and with it a 50 percent interest in the Utah Oil Refining Company. In 1931, the plant was moved to its present-day location just north of Salt Lake City. By the end of 1937, the refinery had a total net production of 139,278 barrels, or a daily average of 382 barrels. Due to the competition from truck transportation and the pronounced and growing tendency of California operators to extend their

markets into the Utah area, the Utah company was faced in 1939 with either closing its refinery or building a crude pipeline from Wyoming. Most of the plant's crude oil came from northwestern Colorado and Wyoming by rail. Rather than close the refinery, the Utah Oil Company decided to build a pipeline from Fort Laramie, Wyoming, to Salt Lake City.\(^8\)

In November of 1939, the first oil was received in Salt Lake City via the pipeline. The line operated smoothly even with temperatures close to 36 degrees below zero along the route. The project, which cost about $4,500,000, was the largest pipeline project built by the industry in 1939 and had a capacity of 6,000 to 8,000 barrels per day. The line also held the distinction of being the first pipeline to cross the continental divide. Between 12,000 and 50,000 men were employed to build the 438-mile line.\(^9\)

During the last part of 1941, an attempt was made to persuade the government to authorize a high-octane plant in Salt Lake City. In December, however, the Petroleum Council of National Defense turned down the proposal. In the opinion of the Council aviation gasoline


\(^9\)Ibid., pp. 588-590; Salt Lake Tribune, January 26, 1941, p. 39.
could best be produced at a limited number of the major refineries and no attempt would be made to produce 100-octane gasoline at small or even medium-sized plants. In early December of 1941, the Army Air Force, believing that the storage of aviation fuel on the Pacific Coast was vulnerable to bombing attacks, requested that a tank for storage be made available in Salt Lake City. The Utah Oil Refining Company took a tank out of service, cleaned it, and began unloading the first shipment on December 27th.10

Little can be discovered with respect to the government decision to expand the Utah plant. It is known that in April of 1942 the Standard Oil Company of Indiana was contemplating the construction of three alkylation plants and two installations for production of toluene, butane, and naphtha. It was believed then that the Utah Oil Refining Company would probably build one of the alkylation plants.11

A labor shortage during the construction period was a major problem faced by the company. In November 1943

10Ibid., October 1, 1941, p. 15; December 12, 1941, p. 25; Standard Oil Company (Indiana), p. 614.

11"Standard of Indiana and Subsidiaries Planning Extensive Refining Additions," The Oil and Gas Journal, April 23, 1942, p. 80.
there were approximately 1,500 workers employed on the project. By December the company demanded more construction workers. As a result, the War Manpower Commission placed all building and construction trades on the critical shortage list in the state. The effect of this action was to prohibit the employment of construction workers in areas except through the United States Employment Service or by arrangement with that service. In that same month, the War Production Board halted work on a structural steel unit of the Geneva Steel plant in order to use the workers on the construction of the refinery in Salt Lake City. Director D. M. Nelson of the Board is reported to have said that it was important to the war effort that the high-octane gasoline plant be finished before the structural unit at Geneva be completed. Later in the month, it was noted that there were 528 jobs still available that needed to be filled at the refinery. At the end of December 1943, the construction of the plant was called the "No. 1 war job in this area."  

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12 *Salt Lake Tribune*, November 18, 1943, p. 15; December 15, 1943, p. 17; December 17, 1943, p. 17; December 18, 1943, p. 12; December 31, 1943, p. 11.
In April of 1944, the plant was put into operation when the catalytic cracking tower was placed "on stream." Peak employment during the construction period had been around 2,400 workers, and a considerable number of these were expected to become permanent employees of the plant.13

In June of 1945, the Utah Oil Refinery achieved a world's record in production of 100-octane gasoline. The achievement, made public before the third joint technical meeting of the Standard Oil Company of Indiana, was the production of 40 gallons of 100-octane gasoline from 100 gallons of crude oil.14

In March of 1946, the War Assets Administration announced that the plant was to be sold or leased. The refinery consisted then of 26 buildings with a total of 59,000 square feet of floor area. Its storage capacity was 467,000 barrels of petroleum or gasoline and its refining capacity was 5,500 barrels daily. Later in the month, the Utah Oil Refining Company, the only bidder for the plant, submitted an offer to buy the part of the plant which was adaptable to production of high test gasoline for automobile use. In May, the War Assets Administration authorized the sale of the plant to the Utah Oil Refining

13 Ibid., April 29, 1944, p. 17.
Company, and in August the sale of the plant, at the price of $4,148,300, became final with the approval of the sale by the U. S. Justice Department.15

It is ironic that the Utah Oil Refinery, which was such a success and is still in operation today, would receive such little publicity and notice when first authorized. Both the refinery and the Kalunite plant were unusual or unique plants. The Kalunite plant was the only concern in the country producing alumina from alunite, while the Utah Oil Refinery was one of two refineries in the nation producing aviation gasoline by the "neohexane process."16 Yet the Utah Oil Refinery, which cost three times what the Kalunite plant cost, failed to receive the recognition accorded the unsuccessful Kalunite plant.


16 Ibid., June 21, 1945, p. 13.
CHAPTER VII
EITEL McCULLOUGH'S RADIO TUBE PLANT AND VARIOUS OTHER PLANTS

Introduction

One area of manufacturing which received a sizeable number of wartime facilities and became an industry of respectable proportions during the war was the electronics industry. National sales of the industry in 1941 totaled approximately $1,000,000,000. By 1943, however, sales totaled over $4,000,000,000, which was larger than the sales for the prewar American automobile industry. In 1943, Fortune magazine called the change "sudden, sweeping, and as yet barely realized."¹

It was reported in 1944 that:

Few, if any industries, have had a war boom like that of the electronics industry; its output for direct air uses has multiplied more rapidly, according to WPB figures, than that of any other industry—faster even than aviation. And such production reports do not include the costly increased number of vacuum tubes and electromagnets, relays and switches, wires and motors that electronic equipment makers have had to provide for other industries to speed their war production jobs.²

Some idea of how the war affected this industry can be obtained from a description of the Navy's demand for electronic apparatus during the war. At the end of December 1941, the Navy comprised a total of 2,082 vessels and landing craft, in each of which one transmitter and two receivers were installed. By December 1944, this figure had risen to 37,981 as a result of the shipbuilding program. Large aircraft carriers installed 101 complete sets, each consisting of two to fifteen transmitters and receivers. A battleship had 78 such sets; a small motor torpedo boat, seven; and smaller types of landing craft, 13. It has been estimated that between December 1941 and March 1945, 300,000 complete sets, each comprising two to fifteen major units of equipment, had been installed in 38,000 vessels and landing craft.\(^3\)

As for purposes other than communication, it was believed that so great were the wartime strides in the application of electronic controls, that the postwar dollar volume of industrial electronic tubes would out-rank that of tubes for radio reception, long distance telephone, and other communication.\(^4\)

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Of the plants constructed by the Defense Plant Corporation in the radio and communications industry, most of them were sponsored by the War Department's Signal Corps. The total investment in 57 plants constructed by the Defense Plant Corporation approximated $55,000,000. The Defense Plant Corporation disbursed an additional $33,000,000 for investment in equipment for lease to manufacturers operating 97 other plants.5

Early Development of the Electronic Tube

Thermionics, the term applied to the study of the discharge of electricity from "hot bodies," was developed in the 17th and 18th centuries. Usually experiments were conducted in air at atmospheric pressure by philosophers on static electricity. During the 1600's, Otto von Guericke invented a primitive vacuum pump and an electrostatic friction machine. The pump made it possible to remove air from a glass vessel and by attaching two electrodes inside the evacuated glass vessel, a colorful discharged gas could be observed. Not much serious investigation was done on the subject until the 1870's, when the work of Wilhelm Hittorf in Germany and William Crookes of Great Britain resulted in research which led

to the development of the electron theory and the development of modern electronic tubes. The incandescent lamp developed by Thomas A. Edison was the father of the radio tube, while a British professor, J. A. Fleming, developed the first vacuum tube detector for radio waves.  

Lee de Forest in 1906 invented a device called the "audion" which he intended to be an improved detector of radio signals. The "audion" forsqueek the paths of gaseous discharge and became a purely electronic device. This invention increased the sensitivity of the vacuum tube by adding a grid, which controlled the flow of electrons. It was eventually discovered that de Forest's tube could not only detect radio signals but could amplify them.

The entry of the United States into World War I postponed further American development of the electronic tube, and directed the accumulated techniques toward immediate military problems, such as radio communication between planes and ground stations. Following the

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war, scores of companies began producing radio tubes for civilian use. Later the vacuum tube was used in the motion-picture industry, in public-address systems, and in the phonograph recording industry. During the 1930's, there was considerable work done to improve the earlier developed applications and to develop new ones. The chief difficulty was the fact that industrial electronic application was ahead of industrial acceptance.  

As was true in World War I, production in electronics manufacturing was greatly increased during World War II. In addition to the need for electronic tubes for communication, the vacuum tube became important for a host of complex and highly developed guidance systems, of which radar was the most important. During the war, the government built several plants which were designed to produce electronic tubes. One such plant was the Eitel McCullough Radio Tube plant in Salt Lake City.

Wartime Operation of the Eitel McCullough Plant

In March of 1942, construction began in Salt Lake City on the radio tube manufacturing plant. The cost of the plant was $1,112,000, of which $353,000 was financed by

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Eitel McCullough—the wartime operators of the plant. The balance was paid by the Defense Plant Corporation. Both the operating company and the construction contractors, the Harrison and Doorman Company, were from San Bruno, California.  

Construction was completed and production began in August of 1942. With the opening of the Salt Lake plant, Eitel McCullough, then only eight years old, became the largest exclusive manufacturer of electronic tubes in the United States. The company reportedly picked Salt Lake City for the location of the plant due to its inland location. The company claimed, however, that the caliber of men and women available for employment in Utah played an important part in the decision for the plant’s location.  

By July 1943, the Eitel McCullough plant in Salt Lake City was receiving state-wide recognition as typified by this statement made by Governor H. B. Maw upon completion of a tour of the plant.

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9 Salt Lake Tribune, March 13, 1942, p. 17; U. S. Civilian Production Administration, Bureau of Demobilization, War Industrial Facilities Authorized, July 1940 to August 1945, pages not numbered.

10 Salt Lake Tribune, July 28, 1943, p. 11; December 6, 1942, p. 3B.
The company is performing real war work by the production of tubes and other devices that will save many of our boys' lives, and I feel confident that this will become a permanent industry, because radio and other forms of communication will expand and develop beyond our fondest hopes, and this plant will be in on the ground floor.\footnote{Ibid., July 21, 1943, p. 15.}

A week after the Governor's visit, the Salt Lake plant received an Army-Navy "E" award for excellence in production in war materials. Six months later, the plant was awarded a "star" to be added to its Army-Navy "E". The "star" signified six additional months of high production achievements. H. V. Wilson, assistant manager of the plant, said of the "E" award:

We feel that this award is a credit to the employees of the plant, since most of them prior to coming here were inexperienced and without special training. We feel that they deserve a great deal of credit for the very short time in which they have won this award.\footnote{Ibid., July 28, 1943, p. 11; January 26, 1944, p. 13.}

One month after receiving the "star" officials announced that work shifts on Saturday and Sunday would be discontinued. The company claimed that this did not mean the closing of the plant, but that the employees were more efficient and were able to work faster. No workers were laid off. On March 8, 1944, however, two
shifts at the plant were eliminated due to the lack of government contracts. Approximately two-thirds of the employees, 1,100 persons, were laid off. The War Department, when announcement of the cancellation of contracts was made, blamed the action on a shift in emphasis in the types of tubes needed. By August 1945, the number of employees at the plant had dropped to 225. Orders at that time were sufficient to keep the plant open only a few more weeks. In October of that year, the Navy reinstated a limited contract to the plant, but only 50 employees were necessary for the program.13

Postwar Use of the Radio Tube Plant

In August 1945, the plant was declared surplus property. The plant was put up for sale in July of 1946, and the value placed on the plant by the government was $735,000.14

In January 1947, three concerns bid on the plant. The bidders were: Western Salvage and Supply of Salt Lake City; Morrison-Merrill and Company of Denver, Colorado; and the Utah State Road Commission. The Commission bid

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13 Ibid., February 27, 1944, p. 1B; March 9, 1944, p. 13; March 12, 1944, p. 9B; March 13, 1944, p. 13; August 18, 1945, p. 15; August 28, 1945, p. 10; October 2, 1945, p. 13.

$150,000 for the structure. One month later, the War Assets Administration turned down all bids.\textsuperscript{15}

In April 1947, the government invited bids on the plant once again. The Utah State Road Commission bid again on the plant, and in August the War Assets Administration approved the Commission's bid of $155,000. The Commission planned to use the factory as a central road shop. To reconvert the plant, the Commission planned the removal of existing machinery and the installation of a new concrete floor and over-head cranes. The estimated cost of the reconversion was $100,000.\textsuperscript{16}

Postwar Significance of the Radio Tube Plant

The end of war brought an apparent finish to the production programs of Eitel McCullough in the state of Utah. It appeared that electronic tube production in the state was strictly a wartime program. Government-supported programs initiated the building of the radio tube factory and the continuance of the plant in Salt Lake City depended upon wartime markets. Once the government stopped purchasing radio tubes, production at the plant ceased.

\textsuperscript{15} Ibid., January 8, 1947, p. 13; February 7, 1947, p. 2.

\textsuperscript{16} Ibid., April 4, 1947, p. 13; August 29, 1947, p. 17.
There never was any indication that Eitel McCullough desired to operate the plant once the war was over. Postwar demand for electronic tubes, as far as Utah was concerned, was apparently insufficient for economical operation of the plant. Fortune even claimed that Eitel McCullough's wartime expansion was a product of government tactics to induce postwar competition in the electronics industry.¹⁷

As with the processing of carnotite in Utah, however, the production of electronic tubes by Eitel McCullough continued in the state as a result of a shift in types of tubes produced. In January 1949, Eitel McCullough announced its intention to return to Utah. In May of that year, the company occupied part of the former Remington Arms plant and was producing high frequency electronic tubes. It planned to manufacture 16-inch television tubes in the future. Later, Eitel McCullough produced electronic equipment for Utah's missile industry.¹⁸

What appeared to be a "dead" industry for Utah in the immediate postwar period did ultimately result in a successful postwar enterprise.


¹⁸Salt Lake Tribune, January 30, 1949, p. 10B; May 26, 1949, p. 17.
Miscellaneous Authorizations

In addition to the plants already discussed, there were several authorizations made and plants expanded with private funds which were significant and deserve attention.

One authorization, for which federal funds were allocated but no plant ever constructed, was for drilling of magnesium deposits in the state. In early 1941, it was thought that Utah held vast magnesium resources which could be utilized by the government for the war. In September 1941, Governor Maw suggested in a telegram to W. S. Knudsen of the Office of Production Management that the government consider Utah as a possible source for magnesium. At the end of September, the Utah Magnesium Corporation announced its intention to construct two plants to produce magnesium at Crescent Junction near Moab, for which the company later asked the government for $75,000,000.19

In October, the Office of Production Management asked for an investigation by the Bureau of Mines for the drilling of the deposits in Utah before any authorizations would be made. In April 1942, the Defense Plant Corporation forwarded $150,000 to the Bureau of Mines for the investigation.

19 Ibid., February 18, 1941, p. 9; September 28, 1941, p. 1A; October 2, 1941, p. 4.
On May 2, 1942, the drilling began in the area. The drilling showed that there were 13,740,000 pounds of metallic magnesium and 13,260 tons of potash per acre in the area. The Utah Department of Publicity and Industrial Development claimed:

This greatest of all potential Utah industries cannot be stifled. Sensible, honest, decent and patriotic business will not permit it nor will millions of Americans whose homes bear Service Stars.20

Thereafter, efforts to establish a magnesium plant were stifled by the government. The War Production Board announced in 1942 that the second expansion program in 1942, increasing annual magnesium capacity to 725,000,000 pounds, was cut to 610,000,000 and finally 586,000,000 pounds. Magnesium in 1943 exceeded demands of the war program and was so great that early in 1944 nearly 40 percent of total installed capacity was shut down. The government administrators were obviously much more cognizant of the supply situation for magnesium than were Utahns.21

In addition to financing by the government, several privately-financed plants were of some significance. As

20Ibid., October 21, 1941, p. 9; April 3, 1942, p. 19; Utah Department of Publicity and Industrial Development, Utah Industrial Development News, December 1, 1942, p. 4.

could be expected, copper facilities were greatly developed. The American Smelting and Refining Company expanded facilities by $217,000, the International Smelting and Refining Company expanded facilities by $1,124,000, Kennecott Copper Company spent more than $13,000,000, and the Utah Copper Company spent $1,032,000 for its plant in Magna. In addition, food processing, electric power generation and transmission, rail transportation, and even parachute production facilities were all developed through private funds. Private financing of facilities in the state during the war amounted to only about 9 percent of the total expansion.22

22 Wartime Industrial Facilities Authorized, pages not numbered.
CHAPTER VIII
SUMMARY AND CONCLUSIONS

In addition to the discussion in Chapter II, there are several conclusions which can be drawn from Utah's industrial development during the war. In the first place, most of the new industrial facilities authorized during the war for the state were located in the already industrialized Wasatch Front. Second, most of Utah's new industry was financed publicly. Third, many of the government built plants were unsuccessful as postwar operations. Fourth, as was probably true elsewhere in the nation, the government had to sell the Utah plants below original cost and accept the loss as a "cost of war." Fifth, although other areas of growth were greater than the primary metals industry, the wartime industrial authorizations for the state revolved around the Geneva Steel plant. Finally, Utah's industrial growth during the period 1939 to 1947 was large, but both the nation and the mountain states had greater increases.

Just as was done nationally, most of Utah's wartime industry was located in already industrialized and populated areas. The industrialized and populated Wasatch Front received the major part of the wartime facilities. Since this area had a large labor supply, existing plants which could be expanded, and developed means of trans-
portation to markets, it received most of Utah's wartime defense authorizations. The combined authorizations for Salt Lake, Tooele, Utah, Davis and Weber counties totals $290,993,000. Most of this figure is accounted for by the huge allotment for Geneva Steel in Utah county. Even if Geneva Steel had not been built in the state, however, the Wasatch Front would have received $103,347,000 out of $123,471,000 worth of new facilities. Table 4 shows state-wide distribution of facilities by counties for Utah. Map 2 on page 170 shows the distribution by counties also.

As was pointed out in Chapter II, most of Utah's wartime industrial development was financed publicly. Approximately 91 percent of the facilities authorized for the state were financed by the federal government. Again, the Geneva Steel plant accounts for a great deal of the public funds. Had the Geneva Steel works not been built in the state, public funds would have accounted for approximately $96,000,000 or 78 percent of the total.

Most of the government financing was for new plants and enterprises in the state, while private financing centered around established concerns. It was to be expected that private investors would be reluctant to invest in new enterprises, the success of which largely depended on wartime demand. The Remington Arms Plant,
Table 4. Distribution of Utah's industrial facilities authorized by Counties, July 1940 to August 1945

<table>
<thead>
<tr>
<th>County</th>
<th>Number of firms authorized</th>
<th>Amount authorized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaver</td>
<td>1</td>
<td>$200,000</td>
</tr>
<tr>
<td>Carbon</td>
<td>2</td>
<td>$2,120,000</td>
</tr>
<tr>
<td>Davis</td>
<td>4</td>
<td>$5,192,000</td>
</tr>
<tr>
<td>Duchesne</td>
<td>2</td>
<td>$203,000</td>
</tr>
<tr>
<td>Iron</td>
<td>1</td>
<td>$300,000</td>
</tr>
<tr>
<td>Piute</td>
<td>1</td>
<td>$280,000</td>
</tr>
<tr>
<td>Salt Lake</td>
<td>17</td>
<td>$63,830,000</td>
</tr>
<tr>
<td>San Juan</td>
<td>3</td>
<td>$1,475,000</td>
</tr>
<tr>
<td>San Pete</td>
<td>1</td>
<td>$90,000</td>
</tr>
<tr>
<td>Tooele</td>
<td>4</td>
<td>$3,006,000</td>
</tr>
<tr>
<td>Utah</td>
<td>5</td>
<td>$217,588,000</td>
</tr>
<tr>
<td>Weber</td>
<td>7</td>
<td>$1,377,000</td>
</tr>
<tr>
<td>Various</td>
<td>10</td>
<td>$15,675,000</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>$311,327,000</td>
</tr>
</tbody>
</table>

Source: see table 7 in Appendix.
Source: See Table 7.

Map 2. Utah's industrial facilities by counties, July 1940 to August 1945.
the Kalunite Plant, the Monticello Vanadium Plant, the tungsten re-treatment plant and the Eitel McCullough Radio Tube Plant were all government-built plants which were sold or dismantled in the post-war period. None of these plants resulted in a postwar industrial facility operated by the wartime operator or for the purpose for which it was originally constructed.

The Geneva Steel Plant, the Columbia pig iron plant, the Utah Oil Refinery and the Lehi Refractories plant all represent successful wartime facilities whose operation in the postwar period was that for which it was originally constructed. All except the refractories plant were operated in the postwar period by the wartime operator. Eitel McCullough did return to Utah after the war, but did not occupy the plant it operated during the war.

It appears that some of these plants, such as the Kalunite and Monticello vanadium plants, were actually "forced" developments of industry, the natural development of which would not have amounted to much. Once the wartime demand, which made their operation possible, was gone these "marginal" operations ceased. The Utah Oil Refinery and Geneva Steel plants were merely extensions of already successful prewar industrial concerns. Once the war was over, their low cost and access to western markets made their operation economical and guaranteed
their postwar success. With the continued operation of the steel industry in Utah, the Lehi Refractories Plant was assured its continued operation.

The establishment of these unsuccessful plants in the state and their wartime effect can be seen further from the fact that Utah received more than the nation did on a per capita basis of new facilities, yet, as will be seen, Utah's growth was not as great during the period 1939 to 1947 as the national growth. In other words, the dollars spent in the state were not as "efficient" as those spent nationally.

The acquisition in the postwar period of the Utah defense plants was largely done by a small group of bidders, usually not more than three or four for any one plant. Although the government rejected bids very often as being too low, the lack of a large number of bidders on any one plant might possibly mean that the government sold the plants at less than real value. Although the sale prices are not known for all the government owned plants in Utah, it is known that the government sold several plants to private concerns for less than cost. Very often the difference was substantial, as in the case of Geneva Steel. The government actually sold the plant for $140,000,000 less than original cost. The Utah Oil Refinery was sold for $11,000,000 less than original cost. The presence of only a handful of bidders (in the case of the refinery,
only one) suggests that buyers did not offer to purchase the plants for their true value. Some of this could be accounted for by depreciated value of the plant facilities, but the majority represents a "cost of war" to the government.

By far the most important wartime facility built in the state was Geneva Steel. Other areas of the economy, however, had a greater percentage of new additions than the primary metals industry. The fabricated metals industry in Utah had twice the percentage increase in the number of establishments that the primary metals industry enjoyed and the percentage increase in the machinery industry was more than four times primary metals.\footnote{An establishment differs from a firm in that a firm may have many establishments. Each branch of a firm is treated as one establishment.} The apparel, furniture and fixtures, and chemicals and related products industries all had greater or comparable increases to the fabricated metals industry. Table 5 compares the number of establishments in both 1939 and 1947 for the nation, mountain states and Utah. Geneva Steel, by virtue of the enormous investment made and the success of its postwar operations, overshadows any single achievement in any industry in the state during the war.
Finally, Utah's industry by any measure made appreciable gains during the war. During the period 1939 to 1947, there was an increase of 223 new establishments in the state. This was a 40 percent increase over the number of establishments in the state in 1939. Both the nation and the mountain states increased the same item by 38 and 33 percent respectively for the same period of time. Table 5 on the following page shows the comparison of the number of establishments for the nation, the mountain states and Utah.

A better measure, however, is the "value added by the manufacturer." The Bureau of Census claims:

In that it approximates the value created in the process of manufacture, value added provides the most satisfactory measure of the relative economic importance of given industries available in the Census of Manufacturers. 2

If the "value added by the manufacturer" is used, comparison to the nation and mountain states indicates that Utah's percentage increase over 1939 is somewhat below average. It is true that Utah increased by 196 percent its "value added by the manufacturer" between the years 1939 and 1947, but the nation increased by

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2U. S. Department of Commerce, Bureau of Census, Census of Manufacturers, 1947, p. 18. The "value added by manufacturer" is calculated by subtracting the cost of materials, supplies, and containers, fuel, purchased electric energy and contract work from the total of shipments.
Table 5. Comparison of number of establishments in nation, mountain states and leading industries in Utah, 1939 and 1947.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Number of establishments 1939</th>
<th>Number of establishments 1947</th>
<th>Increase</th>
<th>Percent change 1939-47</th>
</tr>
</thead>
<tbody>
<tr>
<td>All industries, U.S.</td>
<td>173,802</td>
<td>240,881</td>
<td>67,079</td>
<td>38</td>
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<tr>
<td>All industries, Mountain states</td>
<td>3,787</td>
<td>5,049</td>
<td>1,262</td>
<td>33</td>
</tr>
<tr>
<td>Utah</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All industries</td>
<td>549</td>
<td>772</td>
<td>223</td>
<td>40</td>
</tr>
<tr>
<td>Food and kindred products</td>
<td>257</td>
<td>285</td>
<td>28</td>
<td>10</td>
</tr>
<tr>
<td>Textile mill products</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Apparel and related products</td>
<td>14</td>
<td>33</td>
<td>19</td>
<td>135</td>
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<tr>
<td>Furniture and fixtures industry</td>
<td>11</td>
<td>23</td>
<td>12</td>
<td>109</td>
</tr>
<tr>
<td>Printing and publishing industry</td>
<td>98</td>
<td>128</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Chemicals and allied products</td>
<td>15</td>
<td>30</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>Petroleum and coal products</td>
<td>6</td>
<td>9</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>Stone, clay and glass products</td>
<td>37</td>
<td>58</td>
<td>21</td>
<td>56</td>
</tr>
<tr>
<td>Primary metals industry</td>
<td>16</td>
<td>24</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td>Fabricated metal industry</td>
<td>16</td>
<td>32</td>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td>Machinery (except electrical)</td>
<td>12</td>
<td>17</td>
<td>5</td>
<td>41</td>
</tr>
</tbody>
</table>
Table 5. Continued

<table>
<thead>
<tr>
<th>Industry</th>
<th>Number of establishments</th>
<th>Increase</th>
<th>Percent change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1939</td>
<td>1947</td>
<td></td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Instruments and related products</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>56</td>
<td>118</td>
<td>62</td>
</tr>
</tbody>
</table>

*Includes Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, and Nevada.*


203 percent while the mountain states increased by 211 percent. Table 6 on the following page compares the "value added by the manufacturer" for the nation, the mountain states and Utah.

World War II brought great industrial strides to the state, although there were some set-backs. The industrial development during the Second World War presaged the development which was continued in the post-war era of the Cold War. Both war and the threat of war have initiated great industrial development in the state of Utah.
Table 6. Comparison of value added by manufacturer for nation, mountain states and leading industries of Utah (dollar amounts in thousands)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Value added by manufacturer</th>
<th>Increase</th>
<th>% change 1939-1947</th>
</tr>
</thead>
<tbody>
<tr>
<td>All industries, U.S.</td>
<td>$24,287,304</td>
<td>$49,938,521</td>
<td>203</td>
</tr>
<tr>
<td>All industries, Mtn. States</td>
<td>269,381</td>
<td>569,811</td>
<td>211</td>
</tr>
<tr>
<td>All industries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utah</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food and kindred products</td>
<td>16,660</td>
<td>42,918</td>
<td>157</td>
</tr>
<tr>
<td>Textile mill products</td>
<td>623</td>
<td>1,241</td>
<td>99</td>
</tr>
<tr>
<td>Apparel and related products</td>
<td>710</td>
<td>3,433</td>
<td>383</td>
</tr>
<tr>
<td>Furniture and fixtures industry</td>
<td>417</td>
<td>1,392</td>
<td>335</td>
</tr>
<tr>
<td>Printing and publishing industry</td>
<td>4,219</td>
<td>9,930</td>
<td>122</td>
</tr>
<tr>
<td>Chemicals and allied products</td>
<td>2,040</td>
<td>5,112</td>
<td>150</td>
</tr>
<tr>
<td>Petroleum and coal products</td>
<td>3,196</td>
<td>12,222</td>
<td>285</td>
</tr>
<tr>
<td>Stone, clay and glass products</td>
<td>1,930</td>
<td>5,627</td>
<td>191</td>
</tr>
<tr>
<td>Primary metals industry</td>
<td>10,151</td>
<td>34,999</td>
<td>235</td>
</tr>
<tr>
<td>Fabricated metal industry</td>
<td>1,467</td>
<td>4,212</td>
<td>187</td>
</tr>
<tr>
<td>Machinery (except electrical)</td>
<td>555</td>
<td>3,215</td>
<td>479</td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>--a</td>
<td>21</td>
<td>--b</td>
</tr>
<tr>
<td>Instruments and related products</td>
<td>--a</td>
<td>94</td>
<td>--b</td>
</tr>
<tr>
<td>Other</td>
<td>1,373</td>
<td>5,292</td>
<td>285</td>
</tr>
</tbody>
</table>

*aNot shown in order not to show individual records.

*bCannot be determined.

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Governor H. B. Maw to Senator Abe Murdock, April 24, 1941, Utah State Historical Society Archives.

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Senator Abe Murdock to Governor H. B. Maw, January 6, 1942, Utah State Historical Society Archives.

W. A. Hauck to S. R. Fuller as forwarded in letter from Gus Backman to the Governor, July 16, 1941, Utah State Historical Society Archives.
Table 7. War industrial facilities authorized for Utah, July 1940-August 1945 (amounts in thousands of dollars)

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Product</th>
<th>Amount authorized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Public</td>
</tr>
<tr>
<td>Aluminum Inc.</td>
<td>Marysvale</td>
<td>Alumina, Potassium sulphate</td>
<td>280</td>
</tr>
<tr>
<td>American Can Co.</td>
<td>Ogden</td>
<td>Fabricated metal containers</td>
<td>83</td>
</tr>
<tr>
<td>American Rolling Mill Co.</td>
<td>Salt Lake</td>
<td>Sheet metal</td>
<td>821</td>
</tr>
<tr>
<td>American Smelting and Refining</td>
<td>Garfield</td>
<td>Blister copper, Elemental sulphur, Black arsenic lead</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>Murray</td>
<td>Copper, lead, zinc, impure zinc oxide, lead fume</td>
<td>200</td>
</tr>
<tr>
<td>International Smelting and Refining Co.</td>
<td>Tooele</td>
<td>Electric power generation</td>
<td>70</td>
</tr>
<tr>
<td>Beaver City Corp.</td>
<td>Beaver</td>
<td>Vanadic oxide</td>
<td>70</td>
</tr>
</tbody>
</table>

a Sponsor and source: WBP-DPC

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186
<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Product</th>
<th>Amount authorized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bountiful City Corp.</td>
<td>Bountiful</td>
<td>Electric power generation</td>
<td>51</td>
</tr>
<tr>
<td>Calder Brothers Creamery</td>
<td>Various</td>
<td>Butter, skim milk powder</td>
<td>102</td>
</tr>
<tr>
<td>Carbon Dioxide and Chemical Co.</td>
<td>Various</td>
<td>Carbon dioxide</td>
<td>52</td>
</tr>
<tr>
<td>Carbon City Railway</td>
<td>Various</td>
<td>Rail transportation</td>
<td>263</td>
</tr>
<tr>
<td>Colder Brothers Inc.</td>
<td>Roosevelt</td>
<td>Butter, skim milk</td>
<td>124</td>
</tr>
<tr>
<td>Combined Metals Production Co.</td>
<td>Bauer</td>
<td>Refined resin</td>
<td>190</td>
</tr>
<tr>
<td>Draper Eggs Inc.</td>
<td>Draper</td>
<td>Food processing</td>
<td>77</td>
</tr>
<tr>
<td>Eitel McCullough</td>
<td>Salt Lake</td>
<td>Radio transmission 1,112 tubes, relays</td>
<td>759</td>
</tr>
</tbody>
</table>

*Total Amount Authorized: 1,487*
<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Product</th>
<th>Amount authorized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Power and Light</td>
<td>Various</td>
<td>Electric power transmission</td>
<td>675</td>
</tr>
<tr>
<td>Fruehauf Trailer</td>
<td>Salt Lake</td>
<td>Repair and maintenance</td>
<td>102</td>
</tr>
<tr>
<td>Fur Breeders Agric. Coop.</td>
<td>Midvale</td>
<td>Animal feed</td>
<td>51</td>
</tr>
<tr>
<td>Garfield Chemicals and Mfg.</td>
<td>Garfield</td>
<td>Sulphuric dioxide gas, sulphuric acid</td>
<td>1,376</td>
</tr>
<tr>
<td>Geneva Transportation Co.</td>
<td>Geneva</td>
<td>Motor vehicle transportation</td>
<td>65, 65</td>
</tr>
<tr>
<td>Gladding McBean and Co.</td>
<td>Lehi</td>
<td>Silica brick</td>
<td>625, 625</td>
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<tr>
<td>Kaiser, H.J. Co.</td>
<td>Sunnyside</td>
<td>Coal</td>
<td>863</td>
</tr>
<tr>
<td>Kalumite Inc.</td>
<td>Salt Lake</td>
<td>Alumina</td>
<td>5,454, 5,454</td>
</tr>
<tr>
<td>Company</td>
<td>Location</td>
<td>Product</td>
<td>Total</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>-------</td>
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<tr>
<td>Kennecott Copper</td>
<td>Various</td>
<td>Copper</td>
<td>13,568</td>
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<td>Laher Spring and Tile Co.</td>
<td>Salt Lake</td>
<td>Automotive springs</td>
<td>50</td>
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<td>Lion Coal Co.</td>
<td>Ogden</td>
<td>Coal</td>
<td>219</td>
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<tr>
<td>Morrison Merrill and Co.</td>
<td>Salt Lake</td>
<td>Terminal facilities</td>
<td>58</td>
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<tr>
<td>Nielson and Perry Co.</td>
<td>Salt Lake</td>
<td>Food processing</td>
<td>57</td>
</tr>
<tr>
<td>Ogden Transit</td>
<td>Ogden</td>
<td>Transportation</td>
<td>88</td>
</tr>
<tr>
<td>Ohio Copper Co.</td>
<td>LaSal</td>
<td>Copper</td>
<td>115</td>
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<tr>
<td>Parachute Co. of California</td>
<td>Manti</td>
<td>Parachutes</td>
<td>90</td>
</tr>
<tr>
<td>Pringle R and D Co.</td>
<td>Ogden</td>
<td>Cold packed fruits</td>
<td>98</td>
</tr>
<tr>
<td>Provo City</td>
<td>Provo</td>
<td>Electric power generation</td>
<td>872</td>
</tr>
<tr>
<td>Company</td>
<td>Location</td>
<td>Product</td>
<td>Amount authorized</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------</td>
<td>-------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Remington Arms Co.</td>
<td>Salt Lake</td>
<td>Small arms ammunition</td>
<td>36,212</td>
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<tr>
<td>Richfield Oil Co.</td>
<td>Various</td>
<td>Warehouse and storage</td>
<td>185</td>
</tr>
<tr>
<td>Roosevelt Food Products</td>
<td>Roosevelt</td>
<td>Dehydrated foods</td>
<td>79</td>
</tr>
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<td>Smith Canning Co.</td>
<td>Clearfield</td>
<td>Frozen vegetables</td>
<td>77</td>
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<td>Telluride Power Co.</td>
<td>Various</td>
<td>Electric transmission</td>
<td>50</td>
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<td>Union Carbide Corp.</td>
<td>Salt Lake</td>
<td>Tungsten</td>
<td>423</td>
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<td>United States War Dept.</td>
<td>Dugway</td>
<td>Granite Peak Project</td>
<td>1,475</td>
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<td>United States War Dept.</td>
<td>Ogden Ordinance Depot</td>
<td>Shell loading</td>
<td>5,000</td>
</tr>
<tr>
<td>Company</td>
<td>Location</td>
<td>Product</td>
<td>Amount authorized</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>----------------</td>
<td>-----------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Dugway Proving Grounds</td>
<td>Tooele Grounds</td>
<td>Ordnance testing</td>
<td>217</td>
</tr>
<tr>
<td>Quartermaster Depot</td>
<td>Ogden</td>
<td>Clothing renovation</td>
<td>720</td>
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<tr>
<td>U.S. Smelting and Various Refining Co.</td>
<td></td>
<td>Crude arsenical ore, lead bullion</td>
<td>536</td>
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<tr>
<td>U.S. Steel Co.</td>
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<td>Iron and iron ore</td>
<td>28,440</td>
</tr>
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<td>Columbia Steel and Iron Co.</td>
<td>Ironton</td>
<td>Steel products</td>
<td>187,586</td>
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<td>Geneva Steel</td>
<td>Geneva</td>
<td>Copper</td>
<td>1,032</td>
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<td>Utah Copper Co.</td>
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<td>Copper</td>
<td>1,032</td>
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<td>Utah Fire Clay Co.</td>
<td>Salt Lake</td>
<td>Structural clay products</td>
<td>154</td>
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<tr>
<td>Utah Fuel Co.</td>
<td>Sunnyside</td>
<td>Coking coal and coke</td>
<td>1,257</td>
</tr>
<tr>
<td>Utah Ice and Storage Co.</td>
<td>Ogden</td>
<td>Warehouse</td>
<td>89</td>
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<tr>
<td>Company</td>
<td>Location</td>
<td>Product</td>
<td>Amount authorized</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>-------------------</td>
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<td>Utah Magnesium Co.</td>
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<td>Well drilling</td>
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<td>Utah Oil Refining Co.</td>
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<td>Aviation gasoline</td>
<td>16,454</td>
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<tr>
<td>Vanadium Corp. of America</td>
<td>Monticello</td>
<td>Vanadium pentoxide</td>
<td>1,290</td>
</tr>
<tr>
<td>Wasatch Oil Refining Co.</td>
<td>Woods Cross</td>
<td>Petroleum refining</td>
<td>64</td>
</tr>
<tr>
<td>Washington Gas and Electric Co.</td>
<td>Cedar City</td>
<td>Electric power generation</td>
<td>300</td>
</tr>
<tr>
<td>Weber Central Dairy</td>
<td>Ogden</td>
<td>Dairy products</td>
<td>80</td>
</tr>
<tr>
<td>Western Colorado Power Co.</td>
<td>Various</td>
<td>Electric power transmission</td>
<td>76</td>
</tr>
<tr>
<td>Company</td>
<td>Location</td>
<td>Product</td>
<td>Amount authorized</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------</td>
<td>--------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Western Laundry</td>
<td>Salt Lake</td>
<td>Oil drain valves</td>
<td>$89</td>
</tr>
</tbody>
</table>

*Source is the government agency authorizing the project and amounts noted.*

*Sponsor is the government agency from which the necessary funds were made available.*

<table>
<thead>
<tr>
<th>Sponsor and source</th>
</tr>
</thead>
<tbody>
<tr>
<td>aWPB: War Production Board; DPC: Defense Plant Corporation.</td>
</tr>
<tr>
<td>cWAR: War Department.</td>
</tr>
<tr>
<td>dODT: Office of Defense Transportation.</td>
</tr>
<tr>
<td>eRFC: Reconstruction Finance Corporation.</td>
</tr>
<tr>
<td>fORD: Army Ordnance Corps.</td>
</tr>
<tr>
<td>gCWS: Chemical Warfare Service.</td>
</tr>
<tr>
<td>hPAW: Petroleum Administration for War.</td>
</tr>
</tbody>
</table>

*Source: U.S. Civilian Production Administration, War Industrial Facilities Authorized, July 1940 to August 1945.*