RUBBER PRODUCTION

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COLONEL GODARD: Gentlemen, I know of no greater compliment that could have been paid this College, that is, the student body and the faculty, and the Armed Forces generally, than that paid us this afternoon by the Goodyear Tire and Rubber Company. We have with us this afternoon the entire top-executive staff of that corporation. I shall vary the normal procedure and introduce these gentlemen to you directly.

Would you gentlemen please stand up, turn around, and let these people see you?

Mr. R. F. Dinsmore, Vice President in Charge of Research and Development.

Mr. W. S. Wolfe, Managing Director of Domestic Factories.

Mr. R. B. Bogardus, Managing Director of Rubber Plantations and Rubber purchasing.

Mr. George Reveire, Manager of the Washington Office.

In addition, our speaker--and I would not question his wisdom for the world--has brought a competitor with him. He has brought along Mr. George M. Tisdale, who is Vice President of the United States Rubber Company and was Deputy Director of Rubber during the late months of the war. Mr. Tisdale:

I realize, gentlemen, that any words of mine would be anteclimactic. So I shall introduce Mr. Robert S. Wilson, who is Vice President and Sales Manager of Goodyear Tire and Rubber Company. It is a pleasure to present him to you now. Mr. Wilson.

MR. WILSON: Colonel Godard, gentlemen: Colonel Godard said we have the entire executive staff of Goodyear with us. He doesn't know how many vice presidents we actually have.

It is really a pleasure to be here with you. Without any formalities, I shall head right into my subject. As you all realize, trying to tell all about the rubber industry in the short space of forty-five minutes is quite a job. Notice I did not say "tell all that I know about the rubber industry in forty-five minutes." I could probably do that in less time. This discussion of rubber and rubber products manufacturing, as I have conceived it from what I know of your background and your wishes, divides itself naturally into four main headings---Natural Rubber,

NATURAL RUBBER

The historical use of natural rubber.--Chart 1 shows the amount of rubber (natural and synthetic) used in the world and in the USA each year since 1910. I do not want to go into all the reds and greens and blacks on this chart, but I do want you to get the general view of the broad use of rubber.

Here is 1929. Here we have a drop for three years. Then we are right back up again. Note, however, the steady growth through good times and bad of rubber use.

The USA, as you will see at the bottom of the chart, from 1930 to 1939, used about 51 percent of the world's rubber; it now uses about 66 percent. Incidentally, the per-capita use of new rubber of all types in the USA is now 17 pounds per person; in the rest of the world, only two-thirds of a pound per person.

I show this chart to indicate that rubber is of constantly growing importance and probably will continue to grow in importance. That is to say that the uses to which rubber can be put have been constantly widening, so that the use per pound per inhabitant has been growing steadily and will probably continue to grow. As you see, world use has gone above 1,600,000 tons. It is estimated to go down from that point, this 1,600,000 being rather abnormally high due to the filling of the post-war vacuum. It is estimated to go back up to 1,700,000 tons. My belief is that it will go even higher than that, nearer to 2,000,000 tons, within the course of the next decade.

USA consumption of all rubbers.--Chart 2 shows the monthly consumption of natural, synthetic, and reclaimed rubber from 1940 through 1947. I want to show you on this one chart, without too many confusing lines, the relationship among synthetics, natural, and reclaimed rubbers. The black line represents the total amount of rubber consumption starting in 1940. These monthly uses drop in 1942 and then gradually move on upward. The natural rubber line drops down very rapidly, the synthetic rubber line rises here, and the lines cross here about the end of 1943, with synthetic rubber continuing on upward. In about the end of 1945 we had the maximum use of synthetic and the minimum use of natural. Then the natural and synthetic lines cross again in 1947, with a rise of natural rubber and a decline of synthetic rubber.

Reclaimed rubber runs along pretty steadily at the rate of about 300,000 tons a year. We shall not talk much about reclaimed rubber in this lecture, but I want you to keep that in mind because it is a very important and steady factor in the whole industry.

Historical review of USA natural rubber stock pile.--Chart 3 shows the trend of the natural rubber stock pile from 1939 to the present time.

What is being done in this regard? A program sponsored by the Bureau of Plant Industry of the US Department of Agriculture was begun several years prior to World War II. At the present time it is costing about $300,000 a year. Up to date, this project has resulted in the development of a type of high-yielding, disease-resistance, rubber tree which is suitable for planting by natives on small farms. In Central and northern South America intensive encouragement of this type of rubber planting could result in the establishment of a new potential source of rubber supply which would be invaluable in any future national emergency. The Goodyear Tire & Rubber Company has pioneered the development of rubber plantations in Latin America and has proven beyond a doubt that such ventures are practical, and furthermore, profitable, with rubber selling in the world markets at from 15 to 20 cents per pound.

The type of rubber tree that has been developed by the Department of Agriculture will be able to produce in excess of 1,200 pounds per acre per year at twelve years of age. Accordingly, some 200,000 acres, planted in this type of rubber will be able to produce this amount that I have been referring to--100,000 tons--annually. Such a program such be encouraged by the appropriation of sufficient public funds to insure its success. It should not cost much more than $25,000,000 to enable our Latin American neighbors to plant 200,000 acres of high-yielding, disease-resistant, rubber trees which in twelve years would have a potential production in excess of 100,000 tons of rubber per annum. The Department of Agriculture already has the technicians and the "know-how" to do this job properly.

Need for stockpiling natural rubber--Based on what I have said up to now, it is obvious that there is need of a government-owned stock pile of natural rubber against any future emergency. How large that stock pile should be is a matter on which there are varying opinions.

This subject has been studied by the Statistical Committee of the Rubber Manufacturers Association and it has issued a voluminous report (copy of which I will leave with you). This report shows the need of a stock pile of natural rubber varying between 300,000 tons and 800,000 tons, depending on various assumptions taken. The government stock pile today is not a matter of public knowledge, but it is estimated generally in the industry at something over 250,000 tons. The three main points to consider in deciding upon the size of the natural rubber stock pile are (1) how long will it take to reactivate the synthetic rubber industry and bring it to full production; (2) how much natural rubber can be expected to arrive from outside our shores during the period of the emergency, and (3) how long an emergency you wish to prepare for.

Rotation of stock pile of natural rubber--Various grades of natural rubber need to be rotated with varying degrees of frequency. A full report to the Munitions Board from its Industry Advisory Committee is available and deals with this subject thoroughly. So much for natural rubber.

As indicated previously, by far the most prevalent type of synthetic rubber is GRS (copolymer), in addition to which there are GRI (butyl), GRN (nitrile), and GRM (neoprene).

Patent pooling.--Fortunately, at the time of Pearl Harbor several American Companies knew how ro make synthetic rubber. At the urging of the Government, these Companies got together and on 19 December 1941 signed an agreement with the Government under which they agreed for ten years to exchange patent rights and discoveries and know-how to the end that USA should have the best possible synthetic rubber with which to fight the war. In other words, all of the know-how and all of the brains in the development of synthetic rubber were put together and pooled, both so far as patents were concerned and so far as actual manpower and brain power were concerned, in order to make the best possible synthetics for the USA during the war. Acting under these agreements, the industry of the USA developed synthetic rubber which proved to be, from experiments made with German synthetic rubber after the war, far superior to the German varieties.

Exchange of processing know-how.--Prior to the war, synthetic rubber had never been used in large quantities on the production lines of industry. To emphasize this, I show you my next chart.

Chart 11 shows how rapid our conversion from natural to synthetic rubber had to be. This was one of the most difficult problems that we had to meet during the war. In other words, from zero we had to go up, in the course of almost one year's time, to a very high percentage of synthetic use. To be able to use that rubber in the end product--to process it through the machinery of the plants, to train men to handle it, and to finish up with a product that would be the best under the circumstances--was a terrific job that the industry had to tackle.

I am not going to take time to elaborate on the contribution of these committees to the total war effort. Actually, time should be taken because it was exceedingly important. The fact that, first, industry buried its natural instincts of competition in cooperation and, second, that those committees in turn worked closely with similar teams from the Armed Services to produce the best possible end product in the minimum possible time was, to me, one of the outstanding things in World War II. I cannot say too much for the personal work done by these men, for the organizational idea of putting together these technical committees covering each general form of product, and for the operation by these committees in developing the best possible end product for the specific use of the Armed Forces. In other words, we not only had to have cooperation within the industry, but we had to have cooperation from the Armed Forces. We had to know what the individual product was going to be used for in order that that product could be developed most quickly and most efficiently to do the job to which it was assigned.

differential in price (i.e., if snythetic rubber-and I am speaking of GRS principaply now-and natural rubber sold at the same price) and lacking any compulsory use, the consumption of synthetic rubber in the USA would probably drop to 10 percent of the total rubber consumption or less. At a differential of 4 cents a pound, (i.e., if natural rubber sold at 4 cents higher than synthetic rubber) synthetic rubber might account for 20 to 30 percent of the total consumption, and as that differential increased, the percentage of synthetic to total would proportionately increase, up to a total of at least 40 percent or perhaps even higher. Conversely, if the price of natural rubber dropped below the price of synthetic rubber, the use of synthetic rubber would in a free market, drop proportionately.

The future of synthetic rubber as a material.--The future of synthetic rubber as a material depends on two principal factors--its relative price compared with natural rubber, and its relative quality compared with natural rubber. From what has been said in the preceding paragraph, it is obvious that the violent fluctuations of the price of natural rubber form both an obstacle and an opportunity for synthetic rubber. If the price of natural rubber should drop to 10 cents a pound or less, as it has in the past, the synthetic rubber industry would be very badly handicapped. If on the other hand, the price of natural rubber should advance to 25 cents or more, as it has frequently in the past, there would be a great opportunity for synthetic rubber.

From the standpoint of quality, no one who is familiar with the triumps of chemistry in the past can doubt that the day will come when chemical rubber will be produced which is the equal of natural rubber. Or more correctly, I should say chemical rubbers will be produced which are the equal of natural rubber because one great advantage of any synthetic material is that it can be varied to match the individual requirements of individual usages. It would seem probably that the new and better synthetic rubber will be of some entirely new polymerization from our present GRS, when you consider the technical effort that has been expended over the past five to ten years or more to improve the present butadiene-styrene combinations.

What should we do with our synthetic rubber industry?

We have approximately 1,000,000 tons annual capacity for synthetic rubber. What we showed you was something over 750,000 tons. That is rated capacity. The actual capacity is approximately 1,000,000. Of this amount 600,000 tons annual capacity might be considered the basic or low-cost producing units.

This 600,000 tons basic unit has been generally considered the bulwark of our national security in the matter of rubber.

It would seem clear that our national security should be safeguarded--

a. By maintaining this 600,000 tons of synthetic rubber capacity in being owned by the Government and operated by the Government to the extent necessary to supply all the general purpose synthetic rubber the

color pigments, etc., are important. So far as we can see now, supplies of all these articles meet the 1,000,000 tons capacities of the rubber producing facilities of the country.

Perhaps the greatest shortage that exists today is in technically trained manpower. The four years of war set the rubber industry back a long ways in the development of technically trained men in the younger age groups. As the older men are dropping out, this shortage is being felt sharply at the present time and will be for some years to come.

LESSONS TO BE LEARNED FROM WORLD WAR II

Efficient and competent management organization.—The most important lesson to be learned from the World War II experience is the necessity of setting up with great promptness a management organization made up of efficient and competent men. Such men must necessarily be drafted from the industry—from management, from production, and from research. Such men should be drafted promptly to direct and control all phases of allocation, production, specification and inventory of raw materials, and end products connected with rubber. Until this was done in the late war, there was tremendous waste of manpower and most of all, a tremendous waste of that all important commodity—time.

In the early days of the war effort, it was the general practice to man the government agencies that had to do with rubber, with personnel drafted from other industries. It was thought that fairer treatment would be received by members of industry if the people administering the government program were outside that industry. Of course, the exact opposite proved to be true. The rubber branch of the old OPM, subsequently WPB, had six changes in branch chiefs in 1941 and 1942, in just about a year's time. The industry no sooner got acquainted with one chief than he was gone and another took his place. These men were from outside the rubber industry. Despite their zeal and their undoubted ability in their own fields, the rubber program suffered.

Finally in October 1942 a Rubber Director was appointed in charge of all phases of the rubber program. This man, William Jeffers, although he was not himself from the rubber industry, brought in competent and experienced deputies from the rubber industry. These men in turn were supported by specialists from various segments of the rubber industry so from that time on, the rubber program really began to move.

Chart No 12 shows the way in which the allocation of rubber and rubber end products was finally set up. Under this plan there was a maximum of efficiency and a minimum of confusion. I shall not go into detail on this chart. I have put it in just so that you who may wish to study the notes of this talk may see the final form of organization that was worked out. It worked quite efficiently and quite smoothly, relatively, throughout the war.

Chart No. 13 shows the consumption of gasoline and tires per car and per truck just prior to the war, during the war and since the war. Note how much further gasoline consumption dropped in 1943 than in 1942. If gasoline rationing had been put into effect promptly at the time of Pearl Harbor, we would have saved a great deal more of our valuable inventory of passenger cars and tires. You can see how rapidly the tires dropped and that gasoline did not drop until nearly a year later.

The importance of the hidden stock pile of rubber in our finished product.--One of the greatest forms of rubber insurance in a future emergency is the great hidden inventory of cars and trucks in operation. How much rubber is represented in this inventory? The rubber content of the unused mileage on the 30,000,000 passenger cars today would amount to over 400,000 tons. Add to that the rubber content of the unused mileage of tires on our 6,400,000 trucks and the rubber in inner tubes, and in the miles of belts, hose, molded goods, footwear and other products, and you probably have a total of over 750,000 tons of rubber in hidden inventory. The value of this inventory is one of the reasons why it is important not to raise the compulsory use of synthetic rubber to the point that would lessen substantially the quality of this inventory. Some of our Legislators have proposed the use of a minimum of 225,000 tons of synthetic rubber annually. Consider this figure in the light of such a situation as we had in 1938 when the total consumption of new rubber in the United States was only 437,000 tons and you can see that over 50 percent of all new rubber in such a case would have to be, by compulsion, synthetic rubber.

If at that time synthetic rubber had not developed beyond its present stage, the resultant end product would be distinctly inferior to that now being manufactured. That in turn would lower the value of this great hidden inventory I have been referring to.

Chart 14 shows pretty clearly how we lived on that hidden inventory during the war. This black section represents the tons for military uses and the red, the tons for civilian uses. You can see how the civilian part dropped very rapdily in 1941 and 1943 and then how, as we came on into 1944 and 1945, the compulsion of transportation and other uses brought up the amount of rubber that had to be allocated for civilian uses.

Importance of skilled workmen and technical engineers.--The manufacture of many rubber products, particularly large truck tires, requires quite a large degree of skill.

The changing specifications of end products, caused by shortages of various raw materials, requires a large amount of technical skill and of technical man-hours. These factors should be kept in mind in the draft programs of any future emergency.

7. We need to keep the stock pile of end products of highest possible quality in the hands of consumers.

8. We need to develop and build up our supply of rubber technicians.

9. We need to remember the importance of prompt gasoline rationing in the case of emergency.

10. We need to conserve and promote the wholehearted cooperation presently existing between the rubber industry and the Armed Services.

Thank you very much, gentlemen.

COLONEL GODARD: I imagine that many of you--I know I do--know much more about rubber industry than you knew before Mr. Wilson started to talk.

Colonel McCULLOCH: I have never been able to understand why a nation that used 50 percent of the world's rubber over a long period of time would be content to haul 90 percent of it half way around the world. Why have we not developed prior to this the growth of rubber in Central and South America?

MR. WILSON: Mr. Bogardus, I am going to ask you to answer that.

MR. BOGARDUS: It has been only within the last eight or ten years that a rubber tree has been developed which is sufficiently disease-resistant to a very virulent leaf disease which is prevalent in Central and South American and that we could say that problem has been licked and we are ready to go. Up to probably two years ago such was not the case; no rubber tree had been developed which could resist this virulent leaf disease.

MR. WILSON: I might add to that the matter of cost. The cost of producing natural rubber in Brazil, for example, and in Peru is in the neighborhood of 60 cents a pound as compared with the prices of between twelve cents a pound and sixteen cents a pound in the Far East.

MR. BOGARDUS: I might add that in addition to the developing of this disease-resistant rubber tree, there has been combined with that characteristic a high-yielding characteristic which makes it now economically feasible to obtain rubber plantations which will compete with the Far East by establishing those plantations in Central and South America.

COLONEL McCULLOCH: That being the case, why would you recommend the utilization of twenty-five millions of appropriated funds for the purpose of getting that activity started? If there is a possibility of profit, would it not be a fair field for private business to go into?

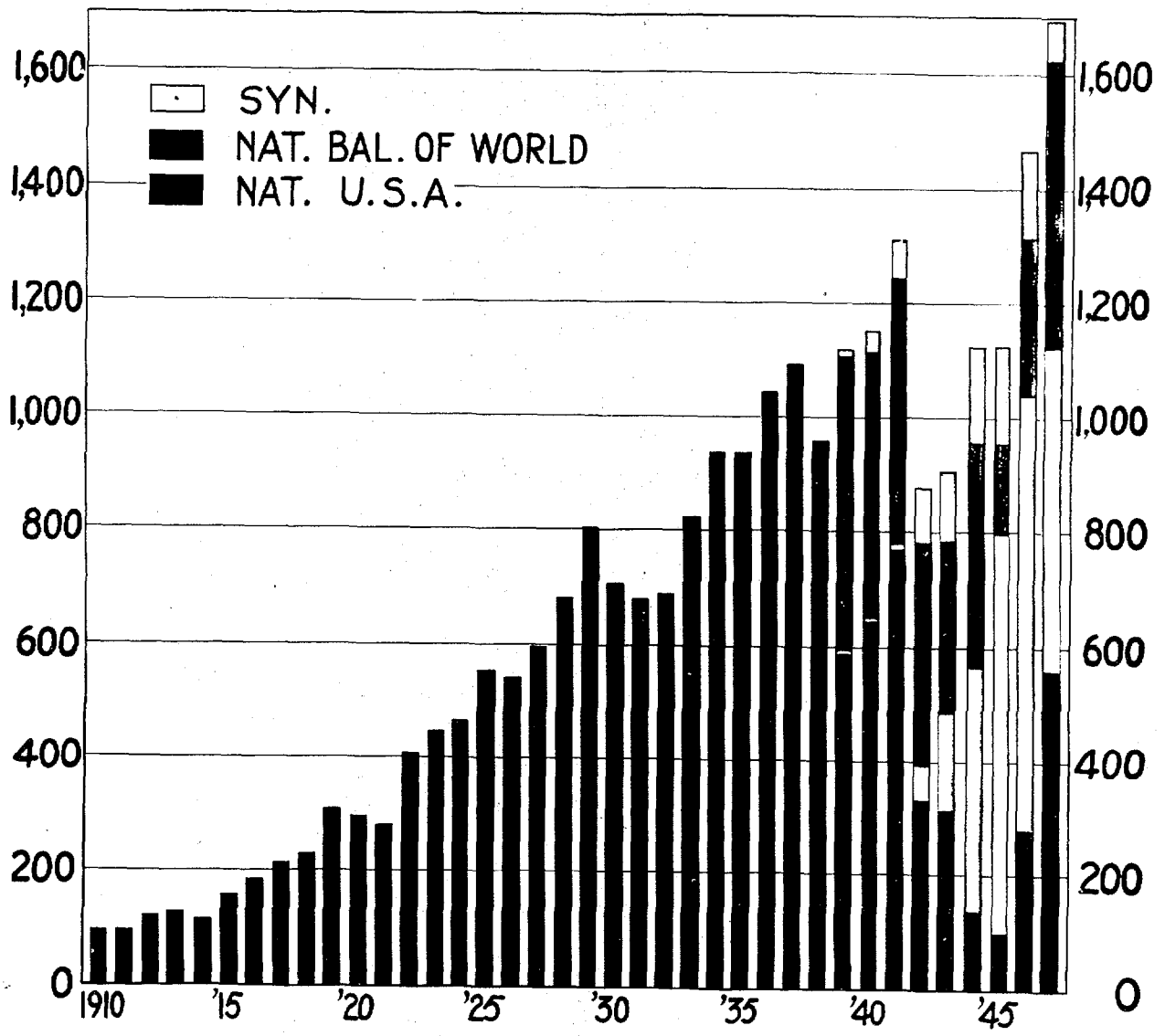
a five-year war, which war would require the use of a million tons of total new rubbers per year. The Chart is a little complicated, and I will not spend much time on it. It will be included in the memorandum covering this lecture. It shows the new supply for the first, second, third, fourth, and fifth years, the consumption rising from a low of 700,000 tons per year--assuming we could cut down to 700,000 tons--and building back up to 900,000 tons per year, and then the stocks at the end of the year. This assumes a stock of natural rubber of about 250,000 tons on 1 January 1948. It also assumes that we can get in from outside our shores 90,000 tons of natural rubber per year. Maybe We can and may be we can't. I put this chart up here simply to show you that this RMA report that I am referring to takes various assumptions of that sort and works out the type of stock pile that would be needed under various assumptions.

COLONEL GODARD: On behalf of the Commandant, sir, I want to thank you for a most enlightening lecture. I will say for my own part that I have learned more today than I have in all of the hours I have spent in this theater, and I think many others feel the same way.

(16 March 1948--450)S/mmg.

WORLD RUBBER CONS.

(THOUSANDS OF LONG TONS)



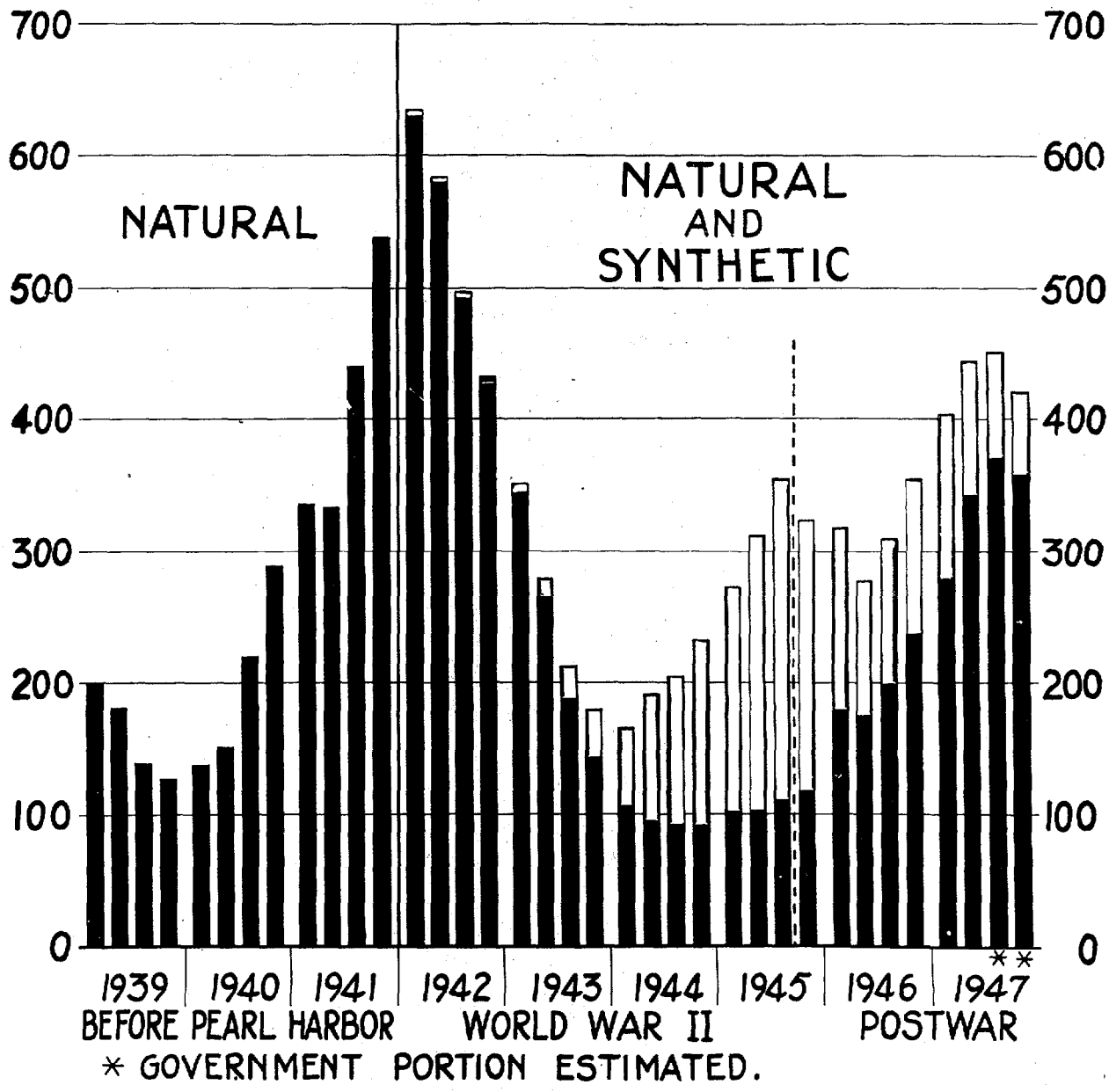
% U.S.A. OF WORLD 1930-39 = 51%

% U.S.A. OF WORLD 1947 = 66%

CHART 1.

U.S. STOCKS OF RUBBER

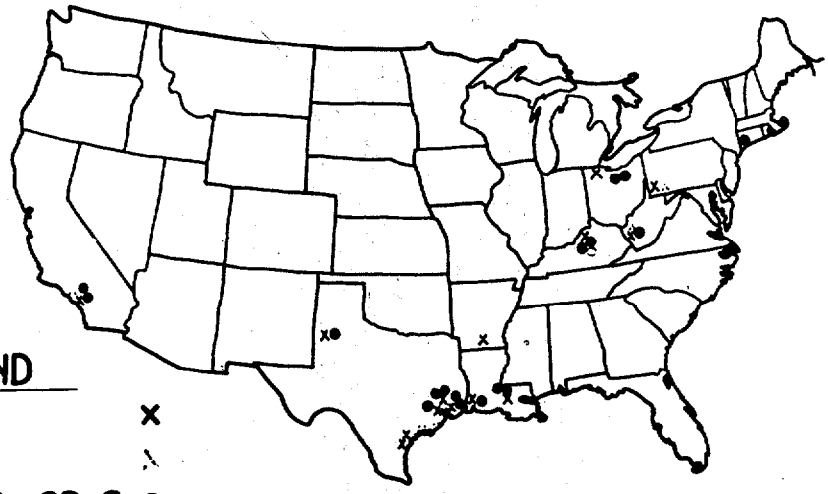
IN THOUSANDS OF LONG TONS
(AT END OF QUARTERS)



* GOVERNMENT PORTION ESTIMATED.

CHART 3.

SYNTHETIC RUBBER PLANTS



LEGEND

BUTADIENE	×
STYRENE	⋋
COPOLYMER - GR-S	●
NEOPRENE - GR-M	⋋
BUTYL - GR-T	●

CHART 5.

GR-M NEOPRENE

COMPANY	LOCATION	INVESTMENT MILLIONS OF DOLLARS	RATED CAP THOUS. OF LONG TONS
E. I. DuPONT	LOUISVILLE KY.	$37	60

GR-1 BUTYL

STANDARD OIL	BATON ROUGE	$25	38
HUMBLE OIL	BAYTOWN, TEXAS	$26	30
TOTAL		$51	68

CHART 7.

STYRENE PLANTS

			INVESTMENT MILLIONS OF DOLLARS	RATED CAPACITY THOUS. OF TONS
CARBIDE & CARBON	(2)	INSTITUTE, W.VA.	$ 9.5	25
DOW CHEMICAL		LOS ANGELES, CALIF.	11.9	25 *
"	"	VELASCO, TEXAS	17.9	50 *
KOPPERS		KOBUTA, PA.	18.8	38 *
MONSANTO	(1)	TEXAS CITY, TEXAS	19.1	50 *
TOTAL (STYRENE)			$ 77.3	188 S.T.

*-600,000 STAND-BY

(1) WILL RESUME 6-1-48
(2) COMPLETELY SHUT DOWN

CHART 9.

% SYNTHETIC RUBBER CONS. OF TOTAL NATURAL & SYNTHETIC-U.S.A

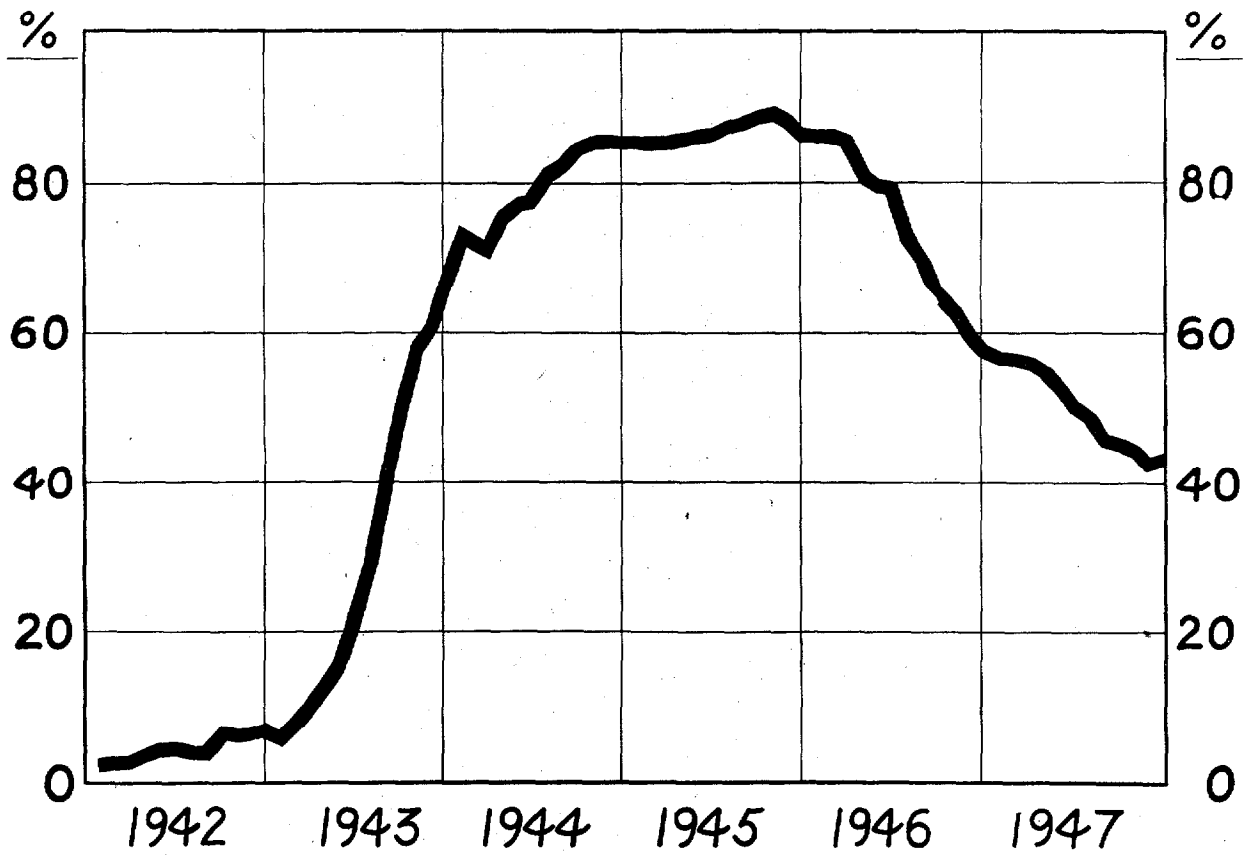


CHART 11.

U.S. GASOLINE CONSUMPTION AND TIRES PER VEHICLE

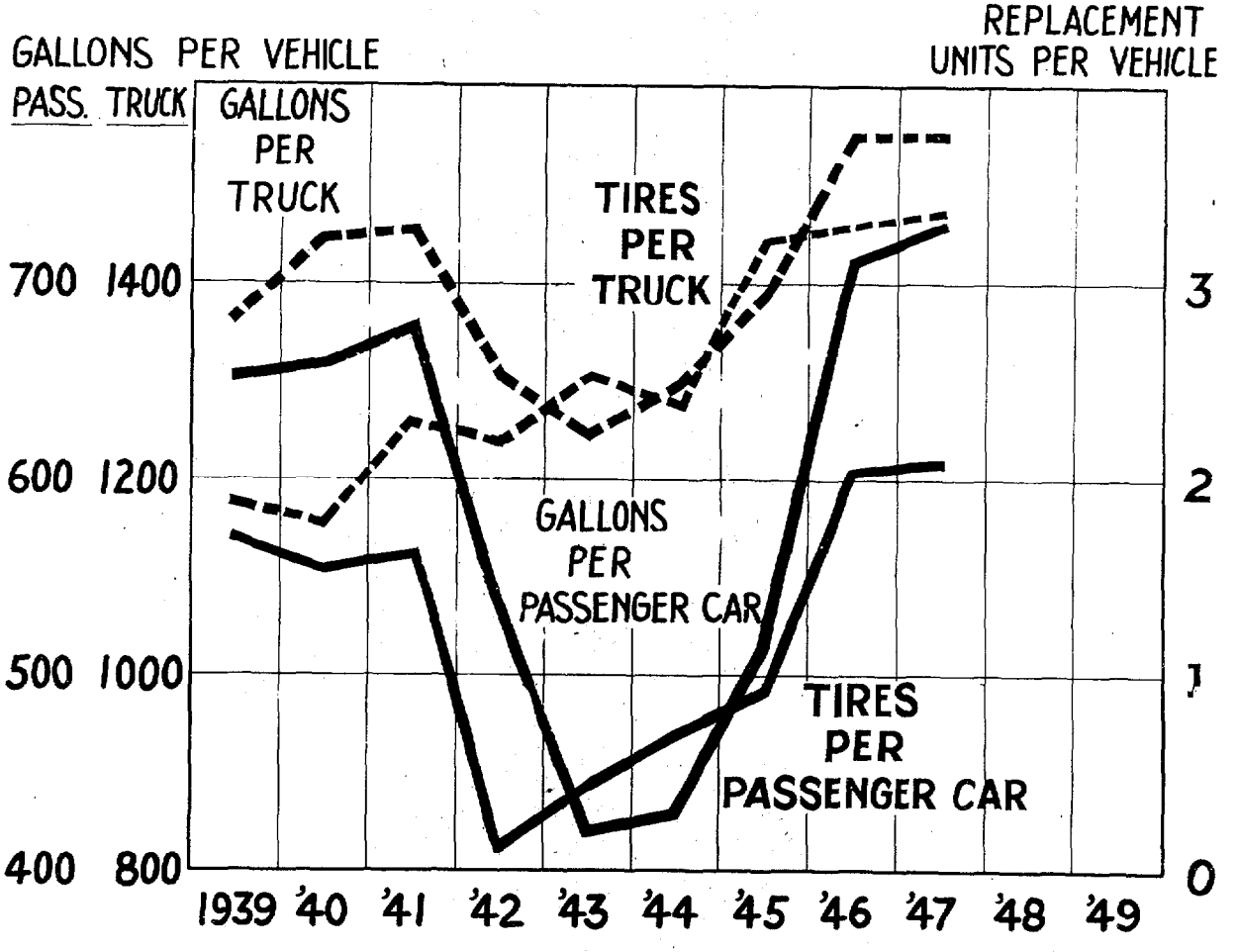


CHART 13.

NATURAL RUBBER PRICES-
RIBBED SMOKED SHEETS

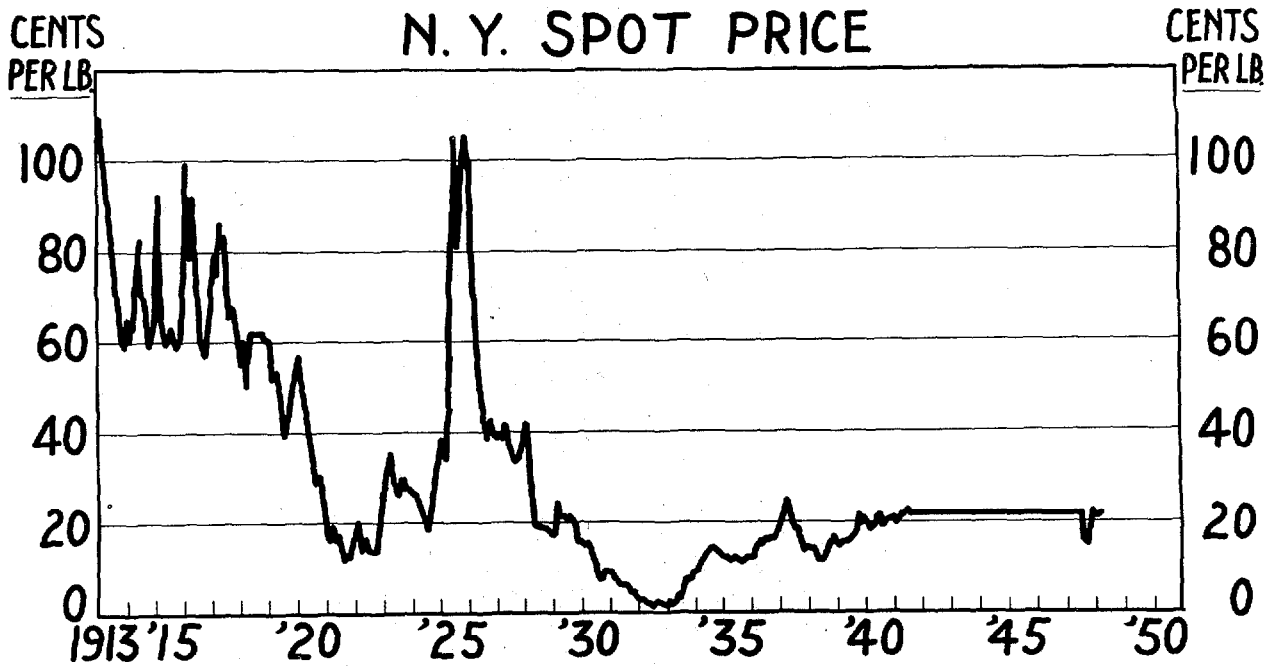


CHART 15.