REPORT OF THE
NATIONAL PETROLEUM COUNCIL'S
COMMITTEE ON CAPITAL AND MATERIALS REQUIREMENTS
FOR INCREASING AVAILABILITY OF PETROLEUM PRODUCTS

(Million-Barrel Committee)

October 31, 1951

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Report of

NATIONAL PETROLEUM COUNCIL'S COMMITTEE ON CAPITAL AND MATERIALS REQUIREMENTS FOR INCREASING AVAILABILITY OF PETROLEUM PRODUCTS

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This report is presented in response to the request of Mr. H. A. Stewart, Director of the Oil and Gas Division, Department of the Interior, for estimates of the cost in capital and materials of increasing the Western hemisphere availability of petroleum products by one million barrels daily over the level of operations during the period November 1, 1950 through January 31, 1951.

The original request dated January 29, 1951 asked for estimates of costs by increments of 250,000 barrels daily and the assumption of current industry product yields.

This committee was appointed promptly by the National Petroleum Council and held its organization meeting on February 12, 1951. At that time four subcommittees were appointed to study the request and develop the estimates for production, refining, transportation and storage respectively. A list of the committees and subcommittees is attached, in Appendix 1.

The preliminary work of the subcommittees indicated that, in the base period, the available capacity in the petroleum industry in the United States was substantially higher than the level of operations during the base period, even though that level was substantially higher than for any previous period. A subsequent report by a committee of

the National Petroleum Council showed crude oil producing capacity in the United States in January 1951, of 6,727,000 barrels daily, or 867,000 barrels daily more than the average production during the base period. A report of the American Petroleum Institute indicated a refining capacity in the United States on January 1, 1951, of 6,860,000 barrels daily, or 640,000 barrels daily more than the runs during the base period. It was apparent from these figures that without any new refinery construction the industry could deliver in the United States at least 500,000 barrels daily of petroleum products more than during the base period, providing necessary transportation and storage facilities were built.

An interim report was submitted by this Committee to the Council on May 9, 1951. In this report it was suggested that the request on the National Petroleum Council for estimates on capital and materials requirements be modified to take into account the facts developed by the preliminary studies. Accordingly, on May 28, 1951, Mr. H. A. Stewart submitted a revised request, attached hereto as Appendix II. This revised request, which is the basis of the present report, called for estimates of the capital and materials required for

(1) Bottleneck removal to permit the year-round utilization of 500,000 barrels daily of the existing reserve producing and refining capacity. This would require the construction of new transportation facilities to move the additional crude oil available to the operable refineries, and storage capacity to enable those transportation and refining facilities

to operate year-round at the required rates.

(2) 300,000 barrels daily of all-new oil production to be found, developed, transported and refined in District III. The necessary refineries to be constructed at two theoretical locations on the Gulf Coast, selected to avoid areas of present congestion, and with new transportation facilities to move the crude oil to the refineries.

(3) 100,000 barrels daily of all-new oil production to be found and developed in Alberta, Canada, with new refining facilities totaling the same capacity to be constructed in the Pacific Northwest, and with necessary new pipe lines to transport the crude oil from the fields to the refineries.

(4) 100,000 barrels daily of new oil production to be found and developed in Venezuela, with necessary new pipe lines and tankers for moving this new crude from the assumed points of production to a refinery or refineries to be constructed on the East Coast of the United States.

The studies of the various subcommittees have involved a very large amount of work. For example, the subgroup on new capacity of the Refining Subcommittee has worked out flow sheets and preliminary designs for four different sizes of refineries at three different locations, and their report comprises 113 pages of text, flow sheets and tables. For the purposes of reporting to the Council, the Committee felt that only a summary of this mass of information should be presented, but if the Oil and Gas Division or the Petroleum Administration for Defense so desire, the various subcommittee chairmen and their assistants will be glad to go into detail as to the

assumptions, background data, methods of calculation, or other information.

The studies of the Committee and its subcommittees have resulted in the development of the various estimates as requested with the exception that it has been found impossible to present reliable estimates on the capital which will be required, either in this country or abroad, to find and develop the specified increments of new crude oil production. The exploration and development process for new crude reserves covers such a long period of time that it is impossible for the industry to trace the costs involved in the availability of the new oil currently being developed, let alone to estimate the amount of oil which may be found in the future as a result of the expenditures for exploration currently being made. No one can tell where or at what depth new reserves will be found or what the overall cost of finding those reserves will be. Other major uncertainties are the costs of leases or foreign concessions in the areas to be developed. Consequently the Committee is not presenting estimates of the capital which will be required to develop the specified increments of production and is of the opinion that any estimates on this point could not be reliable and would be subject to misinterpretation.

It has been possible, however, for the Committee to arrive at reasonably reliable estimates of the steel required in developing new crude oil availability, because most of the steel used by the production branch of the industry is for the drilling of new productive wells after the fields have been

discovered and for the maintenance of operations in existing wells. Comparatively little steel is used up in the exploratory operations of the industry, such as geophysical and geological work. Even in the drilling of dry holes, most of the steel used is recovered for further operations -- but the dollars are not!

The following discussion summarizes the methods of making the estimates for the four increments.

(1) In estimating the transportation and storage requirements needed to get crude to, and store products from, the first increment of 500,000 barrels per day to be made from existing reserve producing and refining facilities, questionnaires were sent out to all refineries, and the excellent PAD report, Petroleum Transportation (July, 1951), was used extensively. An effort was made to get the 500,000 barrels per day increment from that part of the shutdown refinery capacity which could most readily be brought into operation (and much of it has already been brought into at least part-time operation). Most of the remaining spare refining capacity was poorly located, expensive to operate, and would have difficulty in making competitive products.

The 367,000 barrels additional producing capacity (above the 500,000 barrels increment figured on) was not used as part of any of the four increments, but was considered to be highly desirable standby capacity in view of our crude imports which averaged about 500,000 barrels per day during the base period.

(2) In figuring the steel requirements for increasing the

crude producibility in District III by 300,000 barrels per day, the actual results of exploration and development activities for the past three years were carefully compiled and analyzed in conjunction with the report of the National Petroleum Council Committee on Steel Requirements. The data in this latter report include steel used for pumping equipment and maintenance on existing producing wells, consequently, the relation of these figures to the development of new availability tends to overstate somewhat the steel requirements shown herein for new production; unfortunately, no reliable breakdown appears to be available. In addition, it should be noted that the steel requirements estimated do not represent United States averages, but are for a particular area at a particular time. The refineries for the District III increment were assumed to be located on the Gulf Coast, of the sizes indicated in the tables, and the estimates include the costs of land, utilities, refinery storage, loading facilities, etc. Transportation includes pipe lines to get the crude from the probable areas of discovery to the refineries at two different locations, but does not include tankers to move the products since the destinations were not known.

(3) As in the case in the United States, there is considerabl reserve producing capacity in Canada above present production levels. However, the estimated steel requirements for the requested increment of 100,000 barrels daily of new crude production in Canada were based on new wells and new proven reserves in order to avoid any dependence on present reserve producibility and proved reserves. Four refineries, each of 25,000 barrels

per day capacity, were assumed to be located in the Pacific Northwest area, complete with the same appurtenances as mentioned above. Crude oil transportation includes necessary gathering facilities and a pipe line from the Alberta area to Vancouver. Building of this project would free several tankers now supplying this area, but no credit is taken for this.

(4) The increment of 100,000 barrels daily of new Venezuelan crude was based on the assumption of new wells and new discoveries in the eastern part of the country. Western Venezuela was not considered because its extensive acreage of proven reserves would make unrealistic the assumption of all new discoveries. Transportation includes the necessary gathering and trunk pipe lines to bring the crude to deep water, together with the tankers required to complete the haul to a new refinery in the New York area This refinery was designed to handle the full 100,000 barrels daily of Venezuelan crude, and includes all of the facilities mentioned for the two previous cases.

The following Table I summarizes the estimates of the subcommittees and the main committee as to the steel requirements for each of the above-mentioned increments of capacity, and the capital requirements for everything except production. The more important assumptions involved are indicated in the table or footnotes thereto. The steel requirements for developing production are substantially different among various areas, both in the United States and in foreign countries, because of many variable factors, including major differences in the production per well.

Table 1

Estimated Steel and Capital Requirements for Developing Availability of Million Barrels Daily of Petroleum from Sources Specified by Oil and Gas Division

	Total Steel Required, Thousands of Tons				
	500,000 Existing U.S.	300,000 New Dist. III	100,000 New Canada	100,000 New Venezuela	Total
Exploration and Production.....	-	1,210(1)	118(2)	55(2)	1,383
Transportation.....	624	278	190	101(3)	1,193
Refining.....	-	257(4)	89(5)	72	418
Storage(6).....	237	-	-	-	237
Total.....	861	1,745(1)	397	228	3,231
Average tons per daily barrel....	1.72	5.82(1)	3.97(2)	2.28(2)	3.23
	Capital Required, Millions of Dollars				
Exploration and Production.....	None	- - - - - Not available - - - - -			
Transportation.....	202	109	103	71(3)	485
Refining.....	-	257(4)	98(5)	73	428
Storage(6).....	52	-	-	-	52

NOTES:

(1) Includes steel used for maintenance of existing wells; does not include credit for natural gas which on the average would be equivalent in heat value to 234,000 B/D of additional oil.

(2) The lower steel requirements per daily barrel for foreign production, especially Venezuela, reflect the difference among various areas, both in the United States and abroad, due to many variable factors, including major differences in the production per well.

(3) Includes pipe line to coast of Venezuela and tankers from there to East Coast.

(4) Based on three 50,000 B/D, four 25,000 B/D, and five 10,000 B/D refineries, all designed to minimum specification for average industry yields of products.

(5) Based on four 25,000 B/D refineries, designed as above.

(6) Covers only the additional storage needed in order to utilize fully on a year-round basis 500,000 B/D of the excess capacity existing in the base period. The storage requirements of new production, transportation, and refining capacity for the last three increments are included with those figures on capital and steel.

One of the most difficult problems in presenting this summary arises from the fact that in estimating the steel requirements of exploring for and developing oil production in District III (based on actual experience in recent years) the operations inevitably discover a large amount of natural gas, both associated with oil and in dry gas fields. Since these discoveries are also highly desirable for national defense, it is unfair to charge all the steel requirements against the oil only. It should, therefore, be kept in mind that, on the average, for each barrel of oil production developed in District III, an amount of gas equivalent on a B.T.U. basis to about 0.78 barrel of additional oil would be expected. Similarly, gas will be obtained from the Canadian exploration and development work postulated, but the amount cannot be estimated at all closely.

It must again be emphasized that while these figures represent realistic estimates of what the Committee believes could be done by way of increasing production, refining, transportation and storage requirements at the different specified locations and under the specified assumptions, the Committee is not recommending this as a program, or even indicating that the proposed increments are the most economical or desirable ones. Given a favorable economic climate, the industry will and should continue to expand in the future as in the past, based on the individual decisions of many different companies using their own funds. Indeed, a major part

of the indicated amount of expansion has already taken place, and more than this amount of expansion will be accomplished before the end of 1952 if adequate steel supplies are available. The actual expansion, particularly in the "all new" category, will, of course, be quite different in size and location from those herein postulated.

The ability and willingness of the industry to expand with its own funds to meet the growing needs of the civilian economy and the military establishments are well illustrated by the following two charts. The crude producibility figures in Chart I are based on the recent report of the National Petroleum Council Committee on Domestic Crude Producibility, and include none of the foreign increments which are also under way. The domestic refinery capacities shown in Chart II are based on definite industry plans as revealed by questionnaires from the refining subcommittee, and are dependent only on the availability of steel.

Chart I

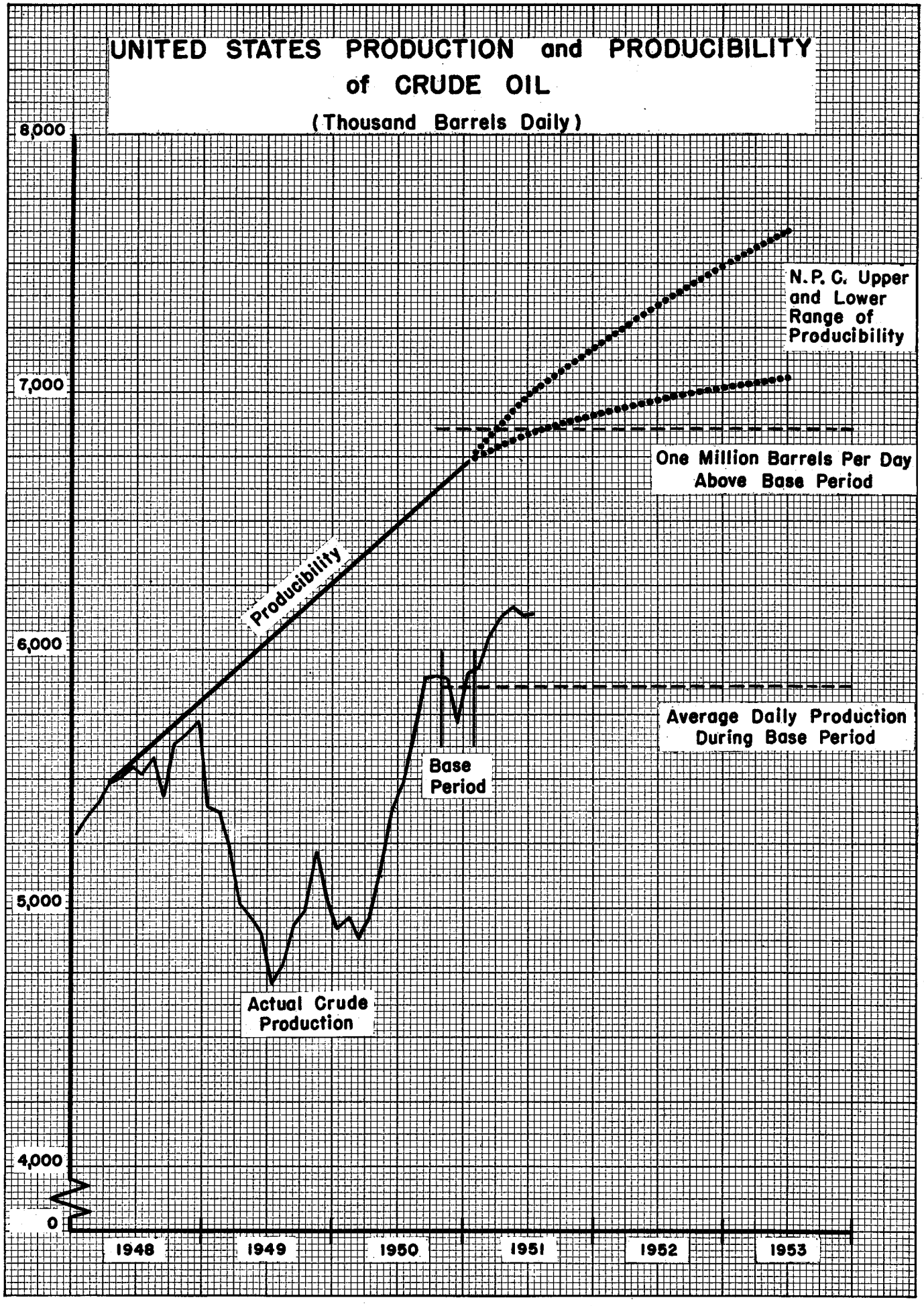
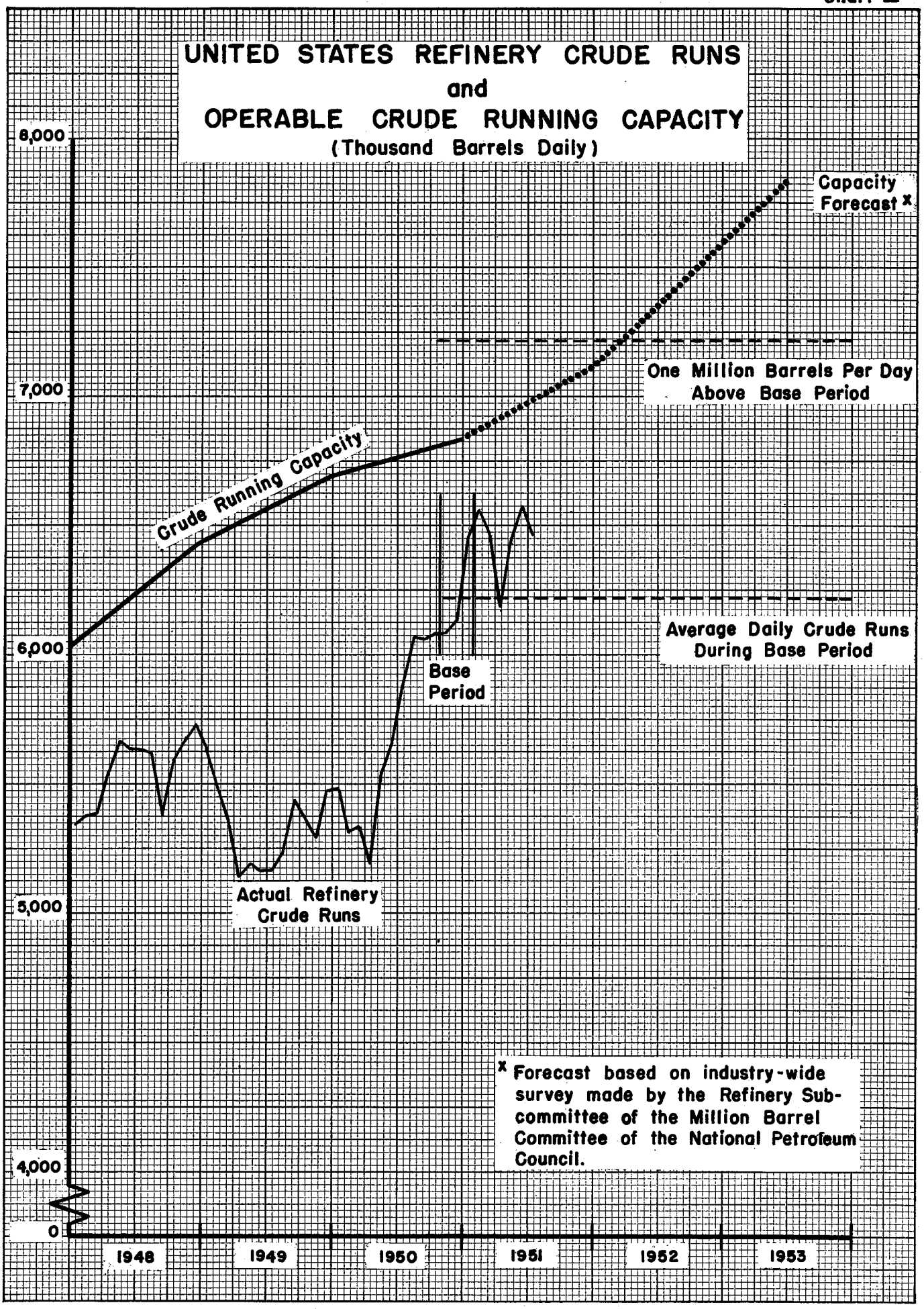

UNITED STATES PRODUCTION and PRODUCIBILITY of CRUDE OIL
(Thousand Barrels Daily)
8,000
7,000
6,000
5,000
4,000
0
1948
1949
1950
1951
1952
1953
N. P. C. Upper and Lower Range of Producibility
One Million Barrels Per Day Above Base Period
Producibility
Average Daily Production During Base Period
Base Period
Actual Crude Production

Chart II


UNITED STATES REFINERY CRUDE RUNS
and
OPERABLE CRUDE RUNNING CAPACITY
(Thousand Barrels Daily)
8,000
7,000
6,000
5,000
4,000
0
Capacity Forecast x
One Million Barrels Per Day Above Base Period
Crude Running Capacity
Average Daily Crude Runs During Base Period
Base Period
Actual Refinery Crude Runs
x Forecast based on industry-wide survey made by the Refinery Sub-committee of the Million Barrel Committee of the National Petroleum Council.
1948
1949
1950
1951
1952
1953

APPENDIX I

COMMITTEE ON CAPITAL AND MATERIALS REQUIREMENTS FOR INCREASING AVAILABILITY OF PETROLEUM PRODUCTS (MILLION BARREL COMMITTEE)

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