Materials Requirements for Oil and Gas Exploration, Drilling and Production 1962

A Report of

THE NATIONAL PETROLEUM COUNCIL

1963

NATIONAL PETROLEUM COUNCIL

REPORT OF THE COMMITTEE ON MATERIALS REQUIREMENTS FOR OIL AND GAS EXPLORATION, DRILLING AND PRODUCTION (1962)

JULY 16, 1963

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CHAIRMAN OF THE COMMITTEE

NATIONAL PETROLEUM COUNCIL COMMITTEE
ON MATERIALS REQUIREMENTS
FOR OIL AND GAS EXPLORATION, DRILLING AND PRODUCTION (1962)

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NOTE: As of March 28, 1963, John R. Evans of Pan American Petroleum Corporation retired and was succeeded on this Working Subcommittee by John W. Phenicie of Pan American.

ORGANIZATION CHART

WORKING SUBCOMMITTEE
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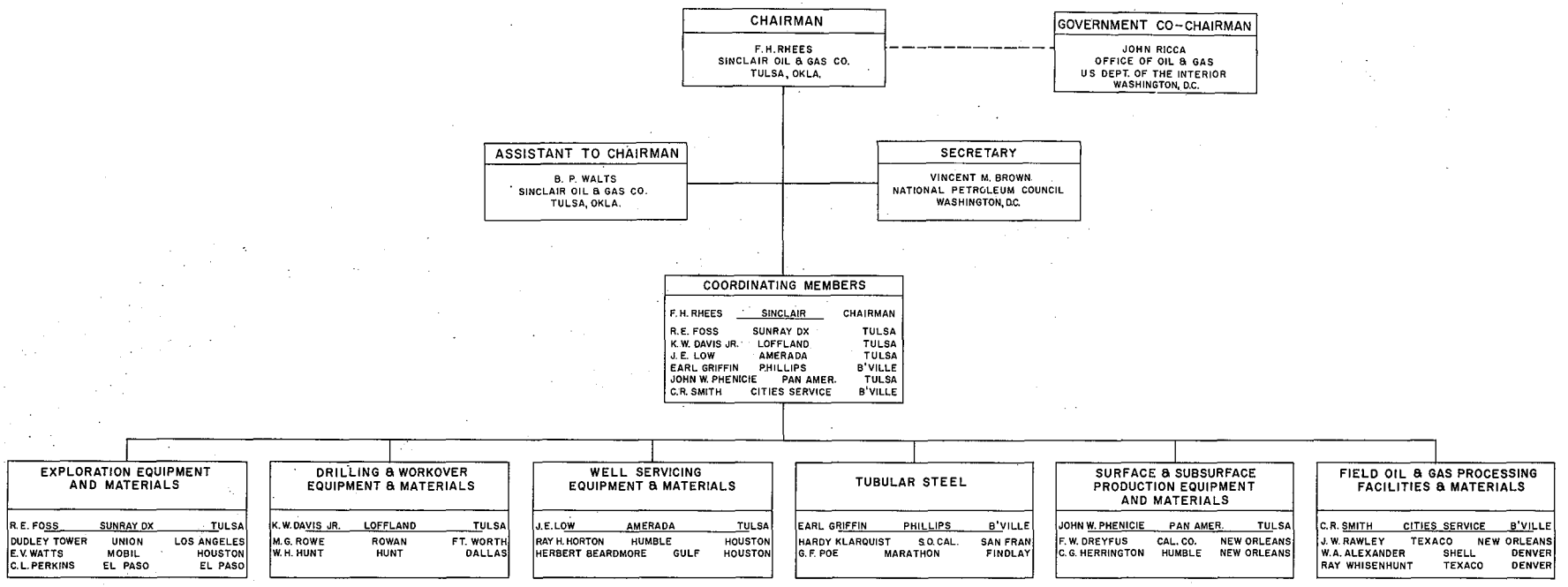

PREFACE

The assignment given the National Petroleum Council's "Committee on Materials Requirements for Oil and Gas Exploration, Drilling and Production (1962)" was to make a thorough study and prepare a report on the current annual requirements for oil country tubular goods, including gas industry needs, and other steel products which, in the opinion of the National Petroleum Council, are important enough to include in this study. It was further interpreted "to include all equipment and materials (i.e., tubular goods, equipment, supplies, etc.) necessary in the exploration and production of oil and gas reserves in the United States, including current annual requirements for geophysical, drilling, lease operations and field oil and gas processing facilities" (see Exhibits 1 thru 8, pages 27-37).

Following establishment of the Committee and Working Subcommittee, a meeting of the Subcommittee was held in Dallas, Texas on February 12, 1963, at which time each member was given a particular work assignment and certain coordinating members were designated as herein shown. The results of the work assignments are detailed within this report, all of which have been combined as shown in the summary.

INTRODUCTION

Since 73.8 percent of the nation's energy requirements in 1962 were furnished by the petroleum industry, the continuance of an adequate supply to meet demand is vitally essential to the national security.

The Department of the Interior, having the responsibility for insuring adequate supplies of these fuels in the event of any emergency, has been developing preparedness plans in connection with which it needs reliable information and data. For this reason, the National Petroleum Council, was requested to undertake this study.

The production of crude oil and natural gas can be maintained on a continuous and expanding basis only if the exploration, drilling and production operations of the industry are carried forward on an uninterrupted basis. In order to drill the necessary number of new wells and maintain existing wells and equipment, the petroleum industry is highly dependent on certain essential materials, primarily, carbon and alloy steel. These critical materials are subject to control in emergency situations by the Business and Defense Services Administration, U. S. Department of Commerce. The claimant agency for such essential materials required by the industry would be the Department of the Interior.

This report, based on 1962 industry operations, is designed to give pertinent information for materials subject to such controls as are necessary in the exploration, drilling and production of oil and gas reserves in the United States. The results of the study are presented by the following categories of operation:

Sec. I - Exploration Equipment and Materials

Sec. II - Drilling Equipment and Accessories

Sec. III - Well Servicing Equipment and Materials, Including Workover Rigs

Sec. IV - Tubular Steel

Sec. V - Surface and Subsurface Production Equipment and Materials

Sec. VI - Field Oil and Gas Processing Facilities and Materials

The detailed data included herein is limited to those materials subject to control in an emergency, as presently included in Section IV-A of the official Class "B" Product List of Controlled Materials, Business and Defense Services Administration, Department of Commerce, issued October 1, 1960. For this reason, materials covered in this report are referred to as "controlled materials". The complete results are given in the summary section and further detail and comment on the above six categories of materials are presented in the body of the report.

REPORT OF THE COMMITTEE ON MATERIALS REQUIREMENTS FOR OIL AND GAS EXPLORATION, DRILLING AND PRODUCTION (1962)

SUMMARY

The following volumes of controlled materials were consumed during the year 1962 for oil and gas exploration, drilling and production in the fifty United States.

Controlled Materials Consumed (1962)	Tons (Short)
Carbon Steel	2,476,900
Alloy Steel 1/	561,008
Copper and Copper Base Alloys	9,402
Aluminum	3,290
Other 2/	1,471
TOTAL	3,052,071

1/ Includes nickel alloy, stainless steel and nickel bearing stainless steel.

2/ Includes aluminum bronze, magnesium, chrome, boron carbide, tungsten carbide, and silver braze.

The above is more specifically detailed in the summarized tabulation by categories of activities on the following page. It is to be noted that 77 percent of the total controlled materials consumed by exploration, drilling and production operations was tubular steel (tubing, casing, drill pipe, drill collars, tool joints, line pipe and standard pipe), while surface and subsurface equipment and materials accounted for 11 percent.

SUMMARY TABLE

MATERIALS REQUIREMENTS FOR OIL AND GAS EXPLORATION, DRILLING AND PRODUCTION (1962)

	CONTROLLED MATERIALS CONSUMED - TONS (SHORT)						
	CARBON STEEL	ALLOY STEEL 1/	COPPER AND COPPER BASE ALLOYS	ALUMINUM	OTHER 2/	TOTAL MATERIALS	PERCENT OF TOTAL
Sec. I - Exploration Equipment and Materials	1,298	832	648	13	-	2,791	.09
Sec. II - Drilling Equipment and Accessories	138,620	91,118	997	725	-	231,460	7.58
Sec. III - Well Servicing Equipment and Materials, Including Workover Rigs	21,707	12,732	393	487	127	35,446	1.16
Sec. IV - Tubular Steel	1,949,000	408,000	-	-	-	2,357,000	77.23
Sec. V - Surface and Subsurface Production Equipment and Materials	278,700	45,111	5,576	1,003	1,344	331,734	10.87
Sec. VI - Field Oil and Gas Processing Facilities and Materials	87,575	3,215	1,788	1,062	-	93,640	3.07
GRAND TOTAL - CONTROLLED MATERIALS CONSUMED (1962)	2,476,900	561,008	9,402	3,290	1,471	3,052,071	100.00

1/ Includes stainless steel and nickel alloy.
2/ Includes magnesium, tungsten carbide, boron carbide, silver braze, chrome and aluminum bronze.

Maintenance and repair items, although not individually listed in all sections of this report, have been considered and are included insofar as controlled materials are concerned.

Supporting equipment not identified as exclusive to the petroleum industry (i.e., automotive, communications, marine, aircraft, etc.), although essential in substantial quantities to operations, has not been included.

There are also items of a general supply nature, such as drilling fluid materials, cement, rubber products, dessicants, water treating chemicals, etc., which are consumed in substantial quantities but are not presently considered controlled materials but may be so in times of an emergency. Drilling fluid materials is a good example, and the following table shows the magnitude, both in volume and value, of 1962 consumption.

ESTIMATED DRILLING FLUID MATERIALS
USED IN UNITED STATES IN 1962

	TONS	VALUE	PERCENTAGE OF TOTAL VALUE
Weighting Materials	1,000,000	$ 46,000,000	33
Clays and Bentonite	360,000	15,500,000	11
Chemicals and Thinners	-	28,000,000	20
Fluid Loss Materials	-	10,000,000	7
Lost Circulation Materials	-	8,500,000	6
Special Muds and Materials	-	32,000,000	23
Total	1,360,000 1/	$140,000,000	100

1/ Weighting materials, clays and bentonite only.

Consumption of certain materials can be alleviated to some extent through the use of substitutes such as plastics. Plastic pipe, within its limitations as to working pressure, temperature, etc., has been developed to a degree of widespread acceptance, and in emergencies could be used more extensively. Aluminum pipe, within its limitations, also could be used more extensively as a substitute.

HISTORICAL LEVEL OF ACTIVITY SINCE THE LAST REPORT OF THE NATIONAL PETROLEUM COUNCIL, DECEMBER 1953

The need to maintain petroleum exploration, drilling and production activities is emphasized by the continuing growth in demand for hydrocarbon products. The following tables indicate the expansion that has occurred in oil and gas supply and demand.

COMPARISON OF U. S. PETROLEUM PRODUCTION AND DEMAND (Crude Oil and Natural Gas Liquids)

	U. S. DEMAND (IN THOUSANDS B/D)	U. S. PRODUCTION (IN THOUSANDS B/D)
1953	7,604	7,112
1954	7,760	7,033
1955	8,460	7,577
1956	8,779	7,951
1957	8,818	7,978
1958	9,083	7,517
1959	9,451	7,932
1960	9,661	7,964
1961	9,806	8,174
1962	10,228	8,349

Source: American Petroleum Institute
Note : Excess of demand over production was met by net imports.

COMPARISON OF U. S. NATURAL GAS
WITHDRAWALS AND MARKETED PRODUCTION

	U.S. GROSS WITHDRAWALS (MILLIONS OF CUBIC FEET)	U.S. MARKETED PRODUCTION (MILLIONS OF CUBIC FEET)
1953	10,645,798	8,396,916
1954	10,984,850	8,742,546
1955	11,719,794	9,405,351
1956	12,372,905	10,081,923
1957	12,906,669	10,680,258
1958	13,146,635	11,030,248
1959	14,229,272	12,046,115
1960	15,087,911	12,771,038
1961	15,460,312	13,254,025
1962	15,810,000 1/	13,750,000 2/

Source: U. S. Bureau of Mines

1/ Estimated. No figure available at this time.
2/ Preliminary from Bureau of Mines.
Note: Excess of withdrawals compared to marketed production may be attributed to gas used for repressuring, stored in underground storage, and unaccounted losses.

The following table denotes an increase in active producing wells over the last ten-year period. However, this trend was altered somewhat in 1962 with a slight decrease in oil wells as compared to the previous year, which was more than offset by the large increase in gas and gas condensate wells.

ACTIVE PRODUCING WELLS IN THE UNITED STATES

	OIL	GAS AND GAS CONDENSATE	TOTAL
1953	498,940	68,223	567,163
1954	511,200	70,192	581,392
1955	524,010	71,475	595,485
1956	551,170	74,261	625,431
1957	569,273	77,041	646,314
1958	574,905	80,400	655,305
1959	583,141	83,225	666,366
1960	591,158	90,761	681,919
1961	594,917	91,208	686,125
1962	588,280	102,545	690,825

Source: World Oil

SECTION I

EXPLORATION EQUIPMENT AND MATERIALS
Seismic, Gravity, Core Drills,
Geochemistry, Radio Frequency, Etc.

Inasmuch as the gravity and magnetic portions of geophysical activity use practically no controlled materials, the majority of the data presented in the accompanying table were based on the seismic industry.

To compile this information, a "typical" seismic crew was selected consisting of one (1) recording truck, one (1) shooting truck, two (2) shot hole drills, and two (2) water trucks. Other equipment, including pick-up trucks, was excluded as well as the original chassis of the other vehicles. These figures for a "typical" crew were then factored based on 1962 activity.

There were 326 domestic seismic crews operating a full year during 1962 (3,915 crew months). Based on a five-year life expectancy, this amounted to approximately 65 sets of equipment consumed during the year, the materials requirements for which are listed in the table on the following page.

EXPLORATION EQUIPMENT AND MATERIALS (1962)
Seismic, Gravity, Core Drills,
Geochemistry, Radio Frequency, Etc.

ITEM	CONTROLLED MATERIALS CONSUMED - TONS (SHORT) CARBON STEEL	ALLOY STEEL	STAINLESS STEEL	COPPER	ALUMINUM
Equipment:					
Recording Truck	70	7	27	7	10
Shooting Truck	190	7	10	7	-
Seismic-Shot Hole Drills	472	304	-	4	-
Water Truck	312	12	21	3	-
Drill Pipe	-	236	-	-	-
Operating Supplies:					
Geophone Cables	250	8	-	105	-
Blasting Cap Wire	-	-	-	520	-
Bits	-	200	-	-	-
Geophones	4	-	-	2	3
TOTAL CONTROLLED MATERIALS CONSUMED (1962)	1,298	774	58	648	13

Listed below are additional supplies and materials, other than controlled materials, which were consumed in large quantities and which could become critical in an emergency.

	QUANTITY
Seismograph High Explosives	20,000 tons
Ammonium Nitrate Blasting Agent	6,000 tons
Electric Blasting Caps	2,100,000
Magnetic Tapes	1,000,000
Photographic Paper (6" x 200' roll)	130,000 rolls
Photographic Chemicals	
Hypo (1-quart can)	160,000 cans
Developer (1-quart can)	160,000 cans

The following table reviews historical data for exploratory activity:

ACTIVE SEISMOGRAPH, GRAVIMETER AND MAGNETIC CREWS IN THE UNITED STATES

	SEISMOGRAPH CREWS (CREW MONTHS)	GRAVIMETER AND MAGNETIC CREWS (CREW MONTHS)
1953	7,608	1,068
1954	6,804	1,104
1955	6,912	1,044
1956	6,072	900
1957	5,772	756
1958	5,076	624
1959	4,980	540
1960	4,625	456
1961	4,557	467
1962	3,915	316

Source: American Petroleum Institute

SECTION II

DRILLING EQUIPMENT AND ACCESSORIES
Excluding Workover Rigs, Well Servicing Units,
Drill Pipe, Casing, Tubing, Etc.

Rig activity during 1962 was the lowest since World War II years. As evidenced by the table on the following page, the major decline began in 1959 and has continued to the current low level for 1962 of 1,637 rotary rigs making hole, and a combined total of 3,089 rotary and cable tool rigs.

In 1962, 95 percent of all drilling was done on a contract basis, and there were 33½ percent fewer contract drilling companies in business than in 1960.

As individual components of active rigs wore out, equipment requirements were generally fulfilled through selective consolidation of idle usable equipment. Consequently, acquisition of new drilling equipment was abnormally curtailed in 1962.

U. S. ANNUAL RIG ACTIVITY AND RATES PER RIG*

	AVERAGE NUMBER RIGS IN USE		AVERAGE ANNUAL DRILLING RATES PER TOTAL RIG	
	ROTARY MAKING HOLE	TOTAL ROTARY & CABLE TOOL	WELLS	FOOTAGE
1953	2,614	4,784	10.3	41,578
1954	2,508	4,635	11.6	46,948
1955	2,683	4,867	11.6	46,491
1956	2,673	4,845	12.0	48,279
1957	2,429	4,791	11.2	46,316
1958	1,923	4,114	11.9	47,978
1959	2,074	3,991	12.8	52,179
1960	1,745	3,543	13.2	53,825
1961	1,764	3,464	13.5	55,301
1962	1,637	3,089	14.9	64,279

Source: The Drilling Contractor

Even though the above reflects a severe reduction in drilling equipment, it should also be noted that each rig accounted for more wells drilled and a considerably greater amount of footage drilled. The next following table also shows the decrease in wells drilled, particularly exploratory wells, with respect to the overall totals.

TOTAL WELLS DRILLED COMPARED TO EXPLORATORY WELLS IN THE UNITED STATES*

	TOTAL WELLS DRILLED	EXPLORATORY (WILDCAT) WELLS DRILLED	EXPLORATORY WELLS AS A PERCENTAGE OF TOTAL WELLS
1953	49,279	11,062	22.4
1954	53,930	11,280	20.9
1955	56,682	12,271	21.6
1956	58,160	13,034	22.4
1957	55,024	11,739	21.3
1958	50,039	9,588	19.1
1959	51,764	10,073	19.4
1960	46,751	9,635	20.6
1961	46,962	9,191	19.6
1962	46,179	9,003	19.5

Source: The Oil and Gas Journal

* Slight inconsistancies result from table comparisons due to source data.

The analysis of controlled materials in the category consumed in 1962 is as follows:

ITEM	CONTROLLED MATERIALS CONSUMED - TONS (SHORT) CARBON STEEL	ALLOY STEEL	COPPER	ALUMINUM
Drilling Machinery-Rotary Tool	108,070	88,928	719	591
Cable Tool	3,550	1,560	28	19
Offshore Tenders and Mobile Units	27,000	630	250	115
TOTAL CONTROLLED MATERIALS CONSUMED (1962)	138,620	91,118	997	725

These figures do not include service barges, tugs, boats less than 134 feet in length, or aircraft used for supply or transportation necessary in conducting drilling operations. Also excluded are tubular goods, including drill collars, tool joints, etc., which are covered in another work assignment. This tabulation includes accessory equipment for workover units, however, the basic workover rig machinery is included in Section III following.

SECTION III

WELL SERVICING EQUIPMENT AND MATERIALS INCLUDING WORKOVER RIGS

Including Cementing, Perforating, Acidizing, Electric Logs, Well Pulling Units, Drill Stem Testing, Etc.

Since the activity of this category necessarily is related in direct proportion to that of drilling and workover operations, it follows that less equipment and materials were consumed than in previous years. On the other hand, because of the greater number of active wells and concentrated workover programs, some increase in consumption in this category is indicated in the future.

This category was subdivided into two groups. First, available data on well servicing equipment was examined for (a) oil and gas well cementing, (b) gun perforating, acidizing, fracturing and drill stem testing, and (c) oil and gas well logging. This data represents 90 percent of the controlled materials used in this category. Accordingly, the data was factored to obtain the amounts consumed.

The second part of this category was well servicing units, including workover rigs, however accessory equipment for workover rigs is covered in Section II. The data analyzed represented 85 percent of all units consumed and also was factored to derive the total annual consumption.

The data included only that amount of controlled materials actually used in adapting a truck chassis for this use. Controlled materials in the truck chassis itself are excluded. ("Chassis" includes engine and cab.)

The controlled materials consumed in 1962, subdivided as above, are submitted below:

ITEM	CONTROLLED MATERIALS CONSUMED - TONS (SHORT) CARBON STEEL	ALLOY STEEL 1/	COPPER	ALUMINUM	MAGNESIUM
Oil and Gas Well Cementing Equipment	6,299	2,591	20	129	34
Gun-Perforating, Acidizing Fracturing, DST Equipment	9,588	7,658	237	221	86
Oil and Gas Well Logging Equipment	1,300	953	103	110	2
Pulling Units & Workover Rigs	4,520	1,530	33	27	5
TOTAL CONTROLLED MATERIALS CONSUMED (1962)	21,707	12,732	393	487	127

1/ This figure contains 1,260 tons of nickel bearing stainless steel and 670 tons of nickel alloys.

SECTION IV

TUBULAR STEEL

Inasmuch as the tubular steel consumed in exploration, drilling and production is directly related to the number of new well completions, footage drilled, and active producing wells, the following two tables are submitted (refer to Page 7 for active producing wells in U. S.).

ANALYSIS OF NEW WELL COMPLETIONS*

	NEW WELL COMPLETIONS				
	OIL	GAS	DRY	SERVICE	TOTAL
1953	25,762	3,806	18,449	1,262	49,279
1954	29,773	3,977	19,168	1,012	53,930
1955	31,557	3,613	20,742	760	56,682
1956	31,158	4,115	21,838	1,049	58,160
1957	28,012	4,620	20,983	1,409	55,024
1958	24,578	4,803	19,043	1,615	50,039
1959	25,800	5,029	19,265	1,670	51,764
1960	21,186	5,258	17,574	2,733	46,751
1961	21,101	5,664	17,106	3,091	46,962
1962	21,249	5,848	16,682	2,400	46,179

Source: The Oil and Gas Journal

* Includes exploratory (wildcat) wells.

DOMESTIC MILL SHIPMENTS OF OIL COUNTRY TUBULAR GOODS AND TOTAL U. S. FOOTAGE DRILLED

	OIL COUNTRY TUBULAR GOODS (THOUS. OF TONS) 1/	NEW FOOTAGE DRILLED (MILLIONS OF FEET) 2/	TONS OF OIL COUNTRY TUBULAR GOODS SHIPPED PER THOUS. FT. OF HOLE DRILLED 1/
1953	1,845	198.8	9.3
1954	2,173	219.0	9.9
1955	2,437	226.3	10.8
1956	2,389	233.9	10.2
1957	2,512	221.9	11.3
1958 3/	1,052 3/	198.2	5.3 3/
1959	1,999	209.2	9.6
1960	1,148	190.7	6.0
1961	1,474	192.1	7.7
1962	1,455	198.6	7.3

Source: 1/ American Iron and Steel Institute - shipped for domestic consumption only from United States mills, does not include use from inventories, imports, unreported mill shipments, rejects, line pipe used as oil country, use of second hand pipe, drill collars or tool joints.

2/ The Oil and Gas Journal

3/ Marked decrease in mill shipments in 1958 was due primarily to increased withdrawals from industry inventories.

Detailed data for tubular steel consumption for 1962 is shown on the following page.

It is pointed out that a division of 1,796,000 tons of oil country tubular goods consumed in 1962 by total footage drilled reflects a factor of 9.0 tons per thousand feet of hole drilled. This is contrary to the factor of 7.3 tons shipped per thousand feet shown on the table immediately preceding, because of the difference of inventories, imports, etc. as qualified in footnote 1/ and 3/ on page 17.

The figures in the following table were adjusted to compensate for exports, imports, the use of second hand material, etc. Line pipe includes all consumed in oil and gas gathering facilities up to the fence of the gas processing plant or the point of delivery to the crude oil purchaser.

TUBULAR STEEL (1962)
Including Drill Pipe, Casing, Tubing
Drill Collars and Tool Joints

ITEM	CONTROLLED MATERIALS CONSUMED - TONS (SHORT) CARBON STEEL	ALLOY STEEL
Tubing, Casing, Drill Pipe, Drill Collars and Tool Joints	1,414,000 1/	382,000 1/
Line Pipe	434,000	26,000
Standard Pipe	101,000	-
TOTAL CONTROLLED MATERIALS CONSUMED (1962)	1,949,000	408,000

RECAP

TUBING, CASING, DRILL PIPE, DRILL COLLARS AND TOOL JOINTS	ANNUAL TONS (SHORT)
Total - Tubing, Casing and Drill Pipe shipped from American mills	1,503,000
Less Exports	48,000
Shipped for Domestic Consumption	1,455,000
Imports	58,000
Used from inventories	106,000
Unreported mill shipments, rejects, line pipe used as oil country and use of second hand pipe	148,000
Total - Tubing, Casing and Drill Pipe	1,767,000
Drill Collars	17,000
Tool Joints	12,000
TOTAL (1962)	1,796,000 1/

1/ Represents an average consumption of 9.0 tons per thousand feet of hole drilled as cited on page 18.

In recent years more emphasis has been placed on techniques such as tubingless completions and multiple completions using minimum diameter tubular products all of which reduce tonnage consumption. Progressively drilling programs are being keyed to greater depths which require increased tonnage and/or necessitate increased use of high strength and alloy materials - not only because of greater depth but also to withstand higher pressures and temperatures. An historical tabulation of deeper wells drilled, over 15,000 feet, most of which were exploratory (wildcat), is displayed below.

U. S. DEEP WELL OPERATIONS
(15,000' AND BELOW)

	NUMBER OF WELLS	AVERAGE DEPTH PER WELL (Feet)
1953	25	16,117
1954	56	15,929
1955	98	16,031
1956	155	15,988
1957	185	16,064
1958	197	16,019
1959	228	16,056
1960	242	15,945
1961	243	16,124
1962	254	17,000

Source: The Petroleum Engineer

SECTION V

SURFACE AND SUBSURFACE PRODUCTION EQUIPMENT AND MATERIALS

The majority of production equipment consumption parallels new producing well completions. Also, acceleration of secondary recovery and pressure maintenance projects is a significant factor, and, as wells deplete, additional equipment is required. Offsetting this to a minor extent is the rapid application of automation, which allows reduction of tankage.

For the purpose of this study, production equipment is defined as that equipment needed directly or indirectly, to bring oil and/or gas to the point of tender to the pipe line or gas processing plant. This includes heads and trees, rods, bottom hole pumps, pumping units, prime movers, controls (electric and pneumatic), electric generators, tanks, oil and gas separators, treaters, dehydrators, surface pumps, water injection systems, LACT units, etc. Tubular steel, and gas processing plants are not included here but are covered in Sections IV and VI.

SURFACE AND SUBSURFACE PRODUCTION EQUIPMENT AND MATERIALS (1962)

ITEM	CONTROLLED MATERIALS CONSUMED - TONS (SHORT)				
	CARBON STEEL	ALLOY STEEL 1/	COPPER BASE ALLOY	ALUMINUM	OTHER ALLOYS 2/
Wellhead Equipment	2,360	5,601	19	10	-
Christmas Tree Valves	100	4,770	-	-	-
Subsurface Equipment	300	267	-	14	-
Sucker Rod Pumps	7,760	2,290	312	-	-
Sucker Rods and Pull Rods	26,840	20,241	63	-	-
Misc. Sucker Rod Pumping Equipment	300	-	-	-	-
Pumping Units	37,800	6,385	800	-	-
Hydraulic Pumping (Subsurface)	670	1,033	23	26	38
Submersible Electric Centrifugal Pumps	1,210	506	1,514	10	-
Gas Lift Equipment	264	443	6	10	-
Surface Oil Handling Equipment	97,250	320	-	205	-
Surface Gas Handling Equipment	13,660	296	-	48	-
Waterflood Equipment	1,440	551	65	5	-
Surface Pumps	1,150	770	385	17	1,280
Internal Combustion Engines	3,000	650	150	150	-
Fixed Offshore Platforms	80,000	-	-	-	-
Electrical Equipment	1,793	18	1,151	347	-
Automation and Instruments	2,803	970	1,088	161	26
TOTAL CONTROLLED MATERIALS CONSUMED (1962)	278,700	45,111	5,576	1,003	1,344

1/ Includes 2,504 tons Stainless Steel and 2,151 tons Nickel Alloy.
2/ Other alloys consist of the following: 1 ton Tungsten Carbide, 24 tons Boron Carbide, 1 ton Silver Braze, 38 tons Chrome and 1,280 tons Aluminum Bronze.

SECTION VI

FIELD OIL AND GAS PROCESSING FACILITIES AND MATERIALS

This category includes all controlled materials inside the gas processing plant fences. Both field, and main gas transmission line processing plants are included. Helium and sulfur plants are not included, however, hydrocarbon recovery facilities are included when constructed in conjunction with helium plants, as well as the desulfurization and dehydration facilities in gas processing plants.

In addition to the gas processing plants, all field compressor units for producing operations are included. Compressors for main line gas transmission stations are not included.

This report includes 1962 controlled materials consumed in the construction of 67 new plants and for the maintenance of 783 existing plants. Plants started up during the last three quarters of 1962 and the first quarter of 1963 were considered 1962 construction. New plants were classified into four categories (i.e., refrigeration, absorption, adsorption, and refrigeration-absorption) as per the following tabulation:

NEW PLANT CONSTRUCTION	NUMBER	TOTAL CAPACITY, MILLIONS OF STANDARD CUBIC FEET/DAY
Refrigeration	14	1,099
Absorption	2	78
Adsorption	22	451
Refrigeration-Absorption	29	3,484
TOTAL	67	5,112

If the sharp increase in gas and gas condensate well completions continues, it follows that material consumption will increase in future years.

FIELD OIL AND GAS PROCESSING FACILITIES AND MATERIALS (1962)

ITEM	CONTROLLED MATERIALS CONSUMED - TONS (SHORT) CARBON STEEL	ALLOY STEEL	COPPER	ALUMINUM
New Plant Construction	60,399	1,754	1,298	734
Compressors	5,396	661	46	64
Unreported New Construction to Existing Facilities	6,580	242	134	80
Total - Material for New Construction	72,375	2,657	1,478	878
Annual Maintenance Material for Existing Plants	15,200	558	310	184
TOTAL CONTROLLED MATERIALS CONSUMED (1962)	87,575	3,215	1,788	1,062

RECAP BY MAJOR EQUIPMENT

Boilers, Heaters, Cooling Towers and Heat Exchangers	13,970	613	1,254	449
Process Vessels and Tanks	46,842	-	-	-
Pumps, Motors and Electrical	1,233	843	348	20
Instruments and Controls	411	51	18	10
Pipes, Valves and Fittings	11,505	536	17	-
Structural Steel, Insulation, Buildings, etc.	8,218	511	105	519
Compressors	5,396	661	46	64
TOTAL CONTROLLED MATERIALS CONSUMED (1962)	87,575	3,215	1,788	1,062

ACKNOWLEDGMENT

Grateful acknowledgment is given to the many suppliers, manufacturers, industry associations, and individuals for their cooperation. Acknowledgment is likewise given to the U. S. Department of Commerce for use of its "Trends in the Oil, Gas, and Water Well Drilling Machinery and Equipment Industry, 1961" report.

EXHIBIT 1

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON 25, D. C.

COPY

September 26, 1962

Dear Mr. Follis:

In view of the importance of the oil and gas industry to the national security, the joint efforts of the Government and the petroleum industry are necessary to assure that we will have adequate information and be properly prepared to meet any emergency.

I therefore request that the National Petroleum Council appoint a committee to make a thorough study and prepare a report on the current annual requirements for oil country tubular goods, including gas industry needs, and of other steel products which, in the opinion of the Council, are important enough to include in this study. Also, the committee should comment on the possible extent of substitution of plastic pipe under emergency conditions.

We will appreciate such comments and recommendations as the Council deems appropriate in connection with this request.

Sincerely yours,

/S/ JOHN M. KELLY

John M. Kelly
Assistant Secretary of
the Interior

Mr. R. G. Follis
Acting Chairman
National Petroleum Council
1625 K Street, N. W.
Washington 6, D. C.

EXHIBIT 2

REPORT OF THE AGENDA COMMITTEE

of the

NATIONAL PETROLEUM COUNCIL

C
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October 3, 1962

Pursuant to the call of a meeting of the Agenda Committee of the National Petroleum Council made by the Committee's Chairman, Mr. A. Jacobsen, in his wire to the members on September 24, 1962, and with the approval of the meeting and its agenda having been obtained from the Honorable John M. Kelly, Assistant Secretary of the Interior, and Government Co-Chairman of the Committee, the Agenda Committee met on October 3, 1962, at 3:00 P.M. in the office of the National Petroleum Council in Washington, D. C.

Under date of September 26, 1962, the Hon. John M. Kelly addressed a letter (copy of which is attached hereto) to Mr. R. G. Follis, Acting Chairman of the National Petroleum Council, requesting the Council to make a thorough study on the current annual requirements for oil country tubular goods, including gas industry needs, and of other important steel products. It was also requested that the study include comment on the possible extent of substitution of plastic pipe under emergency conditions.

As provided in the Articles of Organization of the Council, this letter was considered at the above mentioned meeting of the Agenda Committee, at which meeting it was unanimously agreed to recommend to the Council the appointment of a committee to make the study as requested by Secretary Kelly and to report to the Council. The committee undertaking the study should not suggest plans or programs but should confine reports to findings of fact.

Under date of October 3, 1962, the Hon. John M. Kelly addressed a letter (copy of which is attached hereto) to Mr. R. G. Follis, Acting Chairman of the Council, requesting the Council to make a thorough study of domestic manpower requirements as of July 1, 1962, throughout the petroleum and gas industries.

As provided in the Articles of Organization of the Council, this letter was considered at the above mentioned meeting of the Agenda Committee, at which meeting it was unanimously agreed to recommend to the Council the appointment of a committee to make the study as requested by Secretary Kelly and to report to the Council. The committee undertaking the study should not suggest plans or programs but should confine reports to findings of fact.

Respectfully submitted,

A. Jacobsen, Chairman
Agenda Committee

EXHIBIT 3

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON 25, D.C.

C
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Y

November 8, 1962

Dear Mr. Follis:

A list of twenty six individuals proposed for membership on the National Petroleum Council Committee on Oil Country Tubular Goods (1962) was attached to your letter of October 25, 1962.

We believe that the individuals suggested for membership would be qualified for service on this Committee. It is noted that you propose to appoint Mr. E. L. Steiniger, of Sinclair Oil Corporation, New York, New York, as Chairman, and Mr. Vincent M. Brown, of the Council's staff, as Secretary of the Committee.

Accordingly, pursuant to Article 6 of the Council's Articles of Organization as amended January 27, 1959, approval is granted for these appointments to the National Petroleum Council Committe on Oil Country Tubular Goods (1962).

Mr. John Ricca, Assistant Director of the Office of Oil and Gas, is designated as Co-Chairman of this Committee.

Sincerely yours,

/S/ JOHN M. KELLY

Co-Chairman
National Petroleum
Council

Mr. R. G. Follis
Chairman
National Petroleum Council
1625 K Street, N. W.
Washington 6, D. C.

EXHIBIT 4

NATIONAL PETROLEUM COUNCIL
1625 K STREET, N. W.
WASHINGTON 6, D. C.

C
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Y

November 9, 1962

Mr. E. L. Steiniger, President
Sinclair Oil Corporation
600 Fifth Avenue
New York 20, New York

Dear Mr. Steiniger:

I am pleased to appoint you Chairman of the National Petroleum Council's Committee on Oil Country Tubular Goods.

The Council, at its meeting on October 4, 1962, unanimously adopted the recommendation of the Agenda Committee (copy of report enclosed) and agreed to undertake a study in response to the request received September 26, 1962 from the Hon. John M. Kelly, Assistant Secretary of the Interior. Secretary Kelly requested the Council to undertake a thorough study of the current annual requirements for oil country tubular goods, including gas industry needs, and of other steel products which are important enough to include in the study. The study should also comment on the possible extent of substitution of plastic pipe under emergency conditions.

Each member of the Committee, as shown on the enclosed membership list, has been informed of his appointment as per the attached sample letter.

As Chairman of this Committee, you will set the agenda, time and place for all meetings, and preside at each Committee meeting. The function of the Co-Chairman of the Committee is to approve the agenda and call of meetings, and to call any meeting of the Committee to a close if he feels it is being improperly used. With respect to obtaining required approvals of the Government Co-Chairman, and to facilitate the handling of other steps involved under the Council's present

rules of procedure, you may wish to utilize the services of the Secretary of your Committee, Mr. Vincent M. Brown, who is also Assistant Secretary-Treasurer of the Council.

In addition to such other duties as you may give to him in connection with the organization and execution of this assignment, the Secretary of your Committee will have the responsibility for meeting transcript or minutes requirements, as the case may be.

By letter of November 8, 1962, Assistant Secretary of the Interior, John M. Kelly, approved the establishment and the membership of this Committee, and designated Mr. John Ricca, Assistant Director of the Office of Oil and Gas, U. S. Department of the Interior, as Government Co-Chairman of the Committee.

I appreciate your willingness to accept this important assignment, and I am pleased to make this formal appointment.

Sincerely yours,

/S/ R. G. FOLLIS

R. G. Follis

Enclosure

EXHIBIT 5

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON 25, D.C.

C
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December 18, 1962

Dear Mr. Follis:

A list of twenty individuals proposed for membership on the Working Subcommittee to the National Petroleum Council's Committee on Oil Country Tubular Goods (1962) was attached to your letter of December 11, 1962.

We believe that the individuals suggested for membership would be qualified for service on this Subcommittee. It is noted that you propose to appoint Mr. F. H. Rhees of Sinclair Oil and Gas Company, Tulsa, Oklahoma, as Chairman and Mr. Vincent M. Brown, of the Council's staff, as Secretary of this Subcommittee.

Accordingly, pursuant to Article 6 of the Council's Articles of Organization as amended January 27, 1959, approval is granted for these appointments to the Working Subcommittee to the NPC's Committee on Oil Country Tubular Goods (1962).

Mr. John Ricca, Assistant Director of the Office of Oil and Gas, is designated as Co-Chairman of this Subcommittee.

Several war studies are presently being undertaken by the Office of Oil and Gas. These studies may require research on materials of a wider scope than that limited just to Oil Country Tubular Goods, as originally requested from the National Petroleum Council. If such be the case, it may be necessary to expand the membership of the proposed Working Subcommittee. This matter is currently being given further consideration. It is hoped that in the near future Mr. Ricca will be in a position to discuss with Messrs. Steiniger, Rhees and Brown the need for such additional members.

Sincerely yours,

/S/ JOHN M. KELLY

Co-Chairman
National Petroleum Council

Mr. R. G. Follis
Chairman
National Petroleum Council
1625 K Street, N. W.
Washington 6, D. C.

EXHIBIT 6

NATIONAL PETROLEUM COUNCIL
1625 K STREET, N. W.
WASHINGTON 6, D. C.

C
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P
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December 22, 1962

Mr. F. H. Rhees
Vice President and Director
Sinclair Oil and Gas Company
Tulsa, Oklahoma

Dear Mr. Rhees:

I am pleased to appoint you Chairman of the Working Subcommittee of the National Petroleum Council's Committee on Oil Country Tubular Goods.

The Council, at its meeting on October 4, 1962, unanimously adopted the recommendation of the Agenda Committee (copy of report enclosed) and agreed to undertake a study in response to the request received September 26, 1962, from the Hon. John M. Kelly, Assistant Secretary of the Interior. Secretary Kelly asked the Council to undertake a thorough study of the current annual requirements for oil country tubular goods, including gas industry needs, and of other steel products which are important enough to include. The study should also comment on the possible extent of substitution of plastic pipe under emergency conditions.

Mr. E. L. Steiniger, President of Sinclair Oil Corporation, is the Chairman of the Committee on Oil Country Tubular Goods. He and the Co-Chairman will give you more specific details on the purpose and scope of your Working Group's assignment. Mr. Vincent M. Brown, Assistant Secretary-Treasurer, National Petroleum Council, is Secretary of both the Main Committee and your Working Subcommittee.

As Chairman of the Working Subcommittee, you will set the agenda, time and place for all meetings and preside at each meeting of your group. Under Council procedure, it is required that the Government Co-Chairman approve the agenda and call of your meetings. To assist you in obtaining these

approvals and to coordinate the availability of facilities of the Council office in connection with your assignment, you may wish to utilize the services of Mr. Brown.

By letter of December 18, 1962, the Assistant Secretary of the Interior, Hon. John M. Kelly, approved the establishment and the membership of this Working Subcommittee, and designated Mr. John Ricca, Assistant Director, Office of Oil and Gas, U. S. Department of the Interior, as Government Co-Chairman of the Subcommittee.

A copy of the membership list of both the Main Committee and your Working Subcommittee are enclosed for your information. There is also enclosed a copy of the letter I am sending to the individual members of your Subcommittee.

I appreciate your willingness to accept this important assignment, and I am pleased to make this formal appointment.

Sincerely yours,

/S/ R. G. FOLLIS

R. G. Follis

Enclosure

cc: E. L. Steiniger
Hon. John M. Kelly
John Ricca

EXHIBIT 7

NATIONAL PETROLEUM COUNCIL
1625 K STREET, N. W.
WASHINGTON 6, D. C.

C
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Y

April 22, 1963

Hon. John M. Kelly
Co-Chairman
National Petroleum Council
c/o U. S. Department of the Interior
Washington 25, D. C.

Dear Mr. Kelly:

On November 8, 1962, you approved the establishment and membership of the Council's Committee on Oil Country Tubular Goods; and on December 18, 1962, you also approved the establishment of the Working Subcommittee thereto.

Upon receiving the original study assignment contained in your letter of September 26, 1962, to the Chairman of the Council, discussions were entered into between the Government Co-Chairman of the Committee, Mr. John Ricca, and the Chairman of the Working Subcommittee, Mr. F. H. Rhees and others. This culminated in a mutual understanding that the requested study and report is interpreted "to include all equipment and materials (i.e. tubular goods, equipment, supplies, etc.) necessary in the exploration and production of oil and gas reserves in the United States, including current annual requirements for geophysical drilling, lease operations, and field oil and gas processing facilities."

We would appreciate your concurrence in this interpretation of the Committee's assignment, and in addition request your approval to change the name of this Committee from the "Committee on Oil Country Tubular Goods" to the "Committee on Materials Requirements for Oil and Gas Exploration, Drilling and Production (1962)", in order that the name of the Committee may more closely reflect the subject matter of its assignment.

Sincerely yours,

/S/ R. G. FOLLIS

R. G. Follis

EXHIBIT 8

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON 25, D. C.

COPY

April 29, 1963

Dear Mr. Follis:

I concur in the interpretation of the assignment of the National Petroleum Council Committee on Oil Country Tubular Goods, as expressed in your letter of April 22, 1963, and also approve the change of name of this Committee from "Committee on Oil Country Tubular Goods" to "Committee on Materials Requirements for Oil and Gas Exploration, Drilling and Production (1962)".

Sincerely yours,

/S/ JOHN M. KELLY

John M. Kelly
Co-Chairman
National Petroleum Council

Mr. R. G. Follis
Chairman
National Petroleum Council
1625 K Street, N. W.
Washington 6, D. C.