CHEMICAL MANUFACTURING FACILITIES OF THE PETROLEUM AND NATURAL GAS INDUSTRIES

A REPORT OF
THE NATIONAL PETROLEUM COUNCIL
1963

NATIONAL PETROLEUM COUNCIL

REPORT OF

THE COMMITTEE ON PETROCHEMICALS (1961)

MARCH 22, 1963

BRUCE K. BROWN
CHAIRMAN OF THE COMMITTEE

REPORT
OF THE
TECHNICAL SUBCOMMITTEE
TO THE
NATIONAL PETROLEUM COUNCIL'S
COMMITTEE ON PETROCHEMICALS

I. ORIGIN AND PURPOSE OF PETROCHEMICALS STUDY

The National Plan for Civil and Defense Mobilization delegates to the U. S. Department of the Interior the responsibility for planning and directing Federal actions during an emergency in the production of "petrochemicals" by the petroleum and gas industries.

At the end of 1960, the Secretary of the Interior, in a letter to the Chairman of the National Petroleum Council (See Appendix A), stated that his Department needed accurate data on the location, products produced and production capacity of chemical manufacturing plants owned by the petroleum and gas industries, in order that Interior might better discharge its emergency and defense mobilization responsibilities in this area. Accordingly, the Secretary requested that the National Petroleum Council undertake a study to obtain authoritative data from the petroleum and gas industries concerning this subject.

The Agenda Committee of the Council, in its report of February 6, 1961, which was unanimously adopted by the NPC at its meeting on February 7, 1961, recommended that a committee be appointed to undertake the study as requested by the Department of the Interior. The Agenda Committee further recommended that because of the great complexity of the subject, the committee to be appointed should confer thoroughly with representatives of the Department of the Interior so as to define the exact scope of the study and determine the manner in which the committee could best comply with the request.

Pursuant to this action, on April 18, 1961, Mr. Walter S. Hallanan, then Chairman of the NPC, acting with the approval of Secretary of the Interior, Stewart Udall, appointed the Committee on Petrochemicals under the Chairmanship of Mr. Bruce K. Brown. Thomas A. Peake, of the Office of Oil and Gas, Department of the Interior, was initially the Government Co-Chairman of the Committee. Subsequently on July 10, 1961, Mr. Maurice L. Webster, Jr., served as Government Co-Chairman, until August 20, 1962, when he was succeeded by Mr. R. Phillip Wheeler.

At the request of Chairman Bruce Brown, Mr. Hallanan, in June, 1961, appointed the Technical Subcommittee to determine the best method of obtaining the data asked for by the

Government, to gather and compile such data, and to report back to the Main Committee. Mr. T. L. Cubbage, Vice President, Phillips Chemical Company, was designated Chairman of the Subcommittee. Membership of the Main Committee appears in Appendix B; and the Subcommittee roster is shown in Appendix C.

II. SCOPE OF ASSIGNMENT

The scope of the study requested by the Secretary of the Interior indicated that it should cover all chemicals except carbon black, ammonia and synthetic rubber, made in those plants owned or operated by petroleum and gas companies or in petroleum facilities, including those jointly owned companies where 50% or greater ownership is in the hands of petroleum and gas companies. It was further specified that the study include synthetic rubber raw materials, sulfur and sulfuric acid of petroleum or gas origin.

With respect to the data desired, the Department of the Interior requested production capacity as of January 1, 1961, additional production capacity already announced, actual 1960 production, raw materials requirements, purchased electric power requirements, manpower requirements and plant locations by latitude and longitude.

III. METHOD USED IN OBTAINING DATA

The Technical Subcommittee met on July 11 and again on September 19, 1961, to review in detail its assignment and develop the "ground rules" for obtaining the requested data. The following was agreed upon:

1. It would be necessary to survey, through the use of questionnaires, all oil and gas companies manufacturing chemicals, including jointly owned companies where 50% or greater ownership is in the hands of petroleum and gas companies.

2. The Subcommittee compiled a list of 86 specific chemicals manufactured by petroleum and gas companies. A questionnaire was then designed to obtain data from all participating companies concerning each of the chemicals appearing on this list, where applicable. (See Appendix D). Reportable chemicals were defined as those substances that meet three tests:

a. Commercial quantities of recognized chemicals which move in trade.

b. Of a quality meeting commercial specifications for chemical use, and,

c. Manufactured by oil and natural gas companies.

Since the Department of the Interior requested that information be supplied on plant locations by latitude and lcngitude, it was agreed that all data would be obtained by individual plants rather than on an overall company basis. In addition, data on purchased electric power requirements and manpower requirements would be obtained on a plant basis rather than on a finished product basis.

3. Data would be requested on the production capacity as of January 1, 1961, for the chemicals listed on the questionnaire, as well as additional production capacity already announced. In addition, data would be requested on total production for the 12 month period, ending December 31, 1960. Participating companies would also be asked to submit information on raw materials requirements on the basis of the individual chemical producing unit.

Following the Subcommittee meetings, and the finalization of the questionnaire and instructions thereto (See Appendix D), on November 22, 1961, the printed forms were sent out by the office of the National Petroleum Council to 294 refining companies and 192 companies with natural gasoline plant operations.

Completed questionnaires were returned by the participating companies directly to the Council office, where they were first coded, the master code and identifying cover sheets

being turned over by the NPC to the Office of Oil and Gas, U. S. Department of the Interior. Then analysis and tabulation of the coded forms was carried out soley by the NPC staff in cooperation with the Subcommittee's Government Co-Chairman. By this procedure, no individual company or plant information was at any time available to any member of either the Technical Subcommittee or the Main Committee. It was, however, understood both by the Committee and the participating companies that all individual plant data is available to the proper officials in the Department of the Interior for use by them or other governmental defense agencies in classified studies.

By June 1, 1962, the NPC staff, after suitable follow-up effort, determined that it had received all the useable returns it could, and a final analysis and tabulation of the data could be made, with the aggregate results to be submitted to the Subcommittee.

IV. DISCUSSION OF RESULTS OBTAINED

1. The Extent of Coverage

From the 486 companies contacted in this survey, detailed data was obtained on 156 chemical manufacturing plants owned by the petroleum and natural gas industries, 49% of which are located in OEP-OCD Region 5. (See Table 1). Approximately 465 plants manufacture petrochemicals in the United States. About 165 of these, owned or operated by oil and gas companies, manufacture the chemicals covered by this survey.* On this basis, your Subcommittee has obtained detailed information on 156 of the plants coming within the scope of its survey, or a coverage of approximately 95 percent.

As agreed by the Subcommittee, the NPC staff tabulated the applicable questionnaires and prepared statistical tables showing U. S. totals for the data obtained (plus regional totals, where feasible). Information reported on electric power and manpower requirements represents the aggregate data submitted by all participants in the survey. It was specifically agreed by the Subcommittee, however, that in order to protect against disclosure, in no case would data be shown for any chemical manufactured by less than 3 companies.

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* Based on the NPC survey and figures shown in "1962 Survey of United States Petrochemical Plants" conducted by the Oil and Gas Journal and published September 3, 1962.

2. Electric Power and Manpower Requirements

Inasmuch as the individual chemical plants represent in most instances only a small part of the overall refining and chemical facility, information on the manpower and electric energy requirements broken down by chemical processing units would not be meaningful, in the opinion of the Subcommittee, without similar information on the basic refinery supplying feedstocks and services. Accordingly, the question was handled as follows:

a. For each chemical on the questionnaire, the reporting company was asked to determine whether the producing plant is self-contained or must be operated as part of a larger facility (non-self-contained). A "self-contained" facility is defined as a physical plant that can maintain continuity of operation (assuming availability of feedstock and power requirements) independent of any other physical unit or facility.

b. If the plant is "self-contained", the reporting company was asked to identify and state manpower and electric power requirements.

c. If the plant is "non-self-contained", the company was asked to identify the larger facility that it

is a part of, and give manpower and electric power requirements for the combined facility.

Table 2 shows the total electric power requirements for the 156 chemical manufacturing plants covered by the survey, by Defense Regions, distinguishing "self-contained" plants from "non-self-contained" facilities.

In the Table sources of electric power for the plants are broken down into power purchased from utilities; that which is self-generated; and other sources of supply (e.g. non-utility companies).

Table 3 presents information on the manpower requirements at chemical processing plants, also distinguishing between "self-contained" and "non-self-contained" facilities. The manpower data is expressed in three broad categories of personnel - operating, maintenance and all other (including supervisory, clerical, etc.).

3. Production, Production Capacity and New Capacity

Of the 86 specified chemicals listed on the questionnaire form, 41 were reported as manufactured by 3 or more companies; 36 were reported on by less than 3 companies; nine of the chemicals listed were not reported as either manufactured or scheduled for production by any of the participating companies (viz. Bis Phenol A, Durene, Ethyl Acetate, 2 Ethyl

Hexanol, Methyl Chloride, Sodium, TEL, TEML, and TML).

Table 4 presents summary data on 41 chemicals produced or scheduled to be produced by 3 or more of the companies participating in this survey. The number of chemical facilities manufacturing a given chemical is indicated. Quantities are specified on a 100% purity basis, but column 3 gives a range of the specification purities of the product produced. In addition, there is shown the actual production of each chemical produced for the calendar year 1960. This includes entire production of any of the chemicals listed regardless of whether they are end-products for a facility manufacturing them or whether they are used all or in part as feedstocks for some other process in the manufacturing facility.

There appears on Table 4 the annual rated production capacity as of January 1, 1961, for each of the chemicals manufactured. This is annual rated productive capacity on a full 24-hour day, 365 days per year basis, with only maintenance and repair interruptions, i.e. as if the particular chemical had been produced throughout the entire year.

It should be noted that a number of chemical facilities are used to make two or more chemicals, either at the same time on a co-production basis, or individually, but on an alternating basis. Table 4 indicates for which of the listed chemicals this is common.

Production capacity for those chemicals alternately produced at the same facility represents a maximum capacity figure for the given chemical, assuming no production for the alternate product or products. Therefore, capacities for alternately manufactured products are not additive.

New capacity in the reporting plants which is scheduled to commence production by July 1, 1963, is also shown on Table 4. Since collection of the data, much of the new production capacity has already gone on stream.

The six chemicals reported being produced by the largest number of reporting plants are as follows:

Chemical Produced	Number of Facilities Reported Producing Chemical
1. Sulfur	43
2. Benzene	31
3. Toluene	29
4. Mixed Xylenes	25
5. Hydrogen	24
6. Propylene	23

4. Principal Materials Consumed

Data was requested on the principal materials consumed at chemical manufacturing plant locations which enter directly into the production of the products manufactured at the plant. In the case of a "non-self-contained" chemical facility, which is, for example, part of a petroleum refinery, participating companies were asked not to list the refinery

crude as a "principal material consumed". Instead, they were asked to give the feedstock or stocks as near down - stream as possible to the inlet of the chemical facility.

Table 5 presents simply a listing of the most frequently reported principal materials consumed entering directly into the production of the chemical specified. Because of the incomplete nature of the data reported, no summary information on normal quantity requirements for these principal materials is presented.

V. CONCLUDING REMARKS

At the commencement of its survey, the Subcommittee understood that the Department of Commerce was expecting the following year to run a similar survey in the Chemical industry on many of the chemicals listed in the NPC survey. Such a survey by Commerce would not be sent to any company included in the NPC survey, so that there would be no duplication of requests for the same information.

Through the NPC Subcommittee survey supplying the Department of the Interior with all of the data obtained, and the contemplated Department of Commerce survey, the Federal Government will have complete information on production of these chemicals.

In conclusion, the Subcommittee extends its appreciation to each company in the industry which cooperated in this important and comprehensive survey.

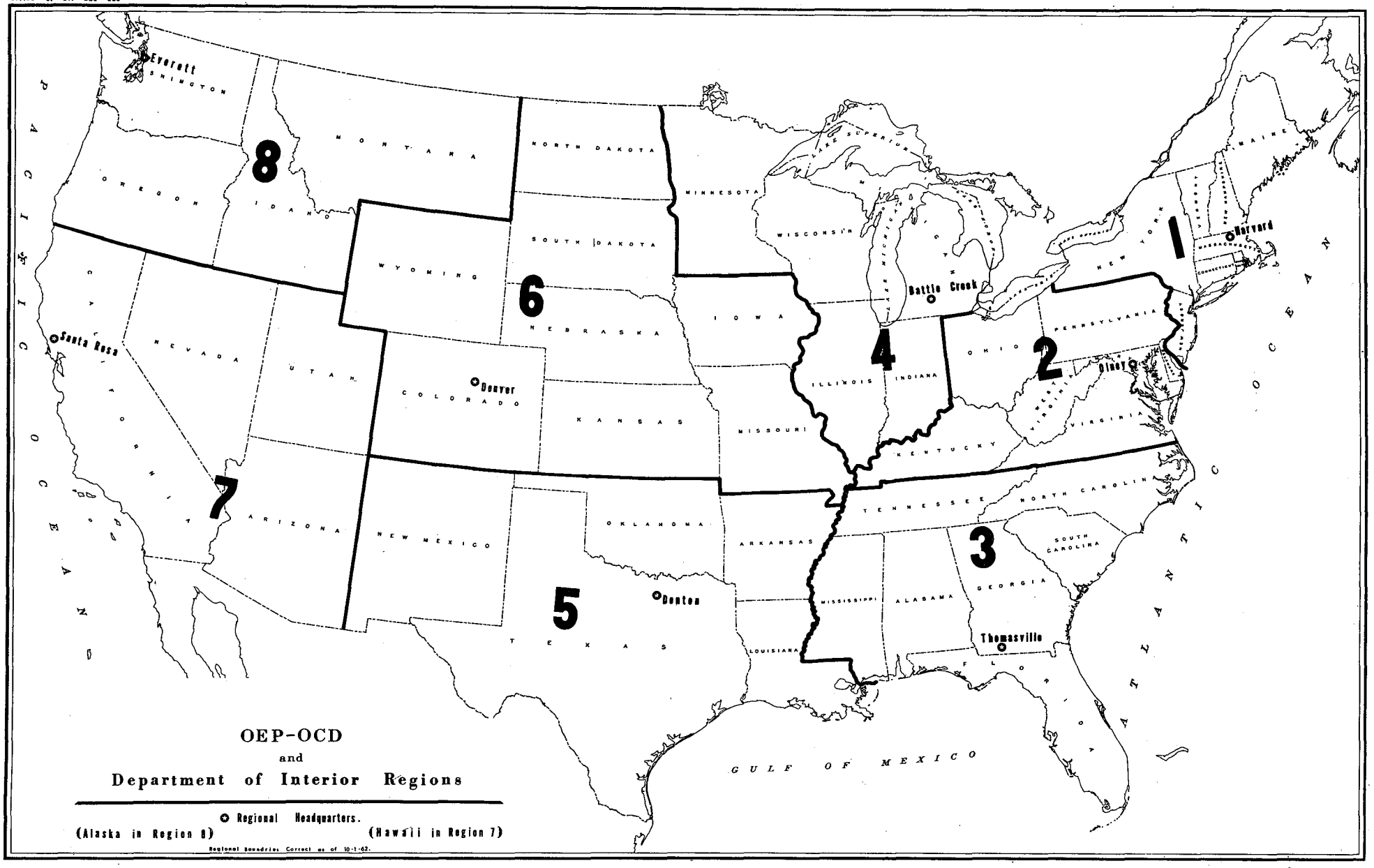
TABLE 1

TOTAL NUMBER OF PLANTS INCLUDED IN NATIONAL PETROLEUM COUNCIL'S SURVEY OF CHEMICAL MANUFACTURING FACILITIES OF PETROLEUM AND NATURAL GAS INDUSTRIES

OEP-OCD REGION IN WHICH PLANT LOCATED	NUMBER OF PLANTS WITH CHEMICAL PRODUCING FACILITIES				
	PRODUCING AS OF JANUARY 1, 1961	SCHEDULED FOR PRODUCTION IN 1961	1962	1963 (1st Half)	TOTAL
1	11	-	2	-	13
2	12	1	1	-	14
3	2	-	-	-	2
4	16	-	1	-	17
5	67	6	4	-	77
6	11	-	-	1	12
7	18	2	-	-	20
8	1	-	-	-	1
TOTAL U. S.	138	9	8	1	156

UNITED STATES
DEPARTMENT OF THE INTERIOR
Office of Oil and Gas

UNITED STATES



OEP-OCD
and
Department of Interior Regions

⊙ Regional Headquarters.

(Alaska in Region 8) (Hawaii in Region 7)

Regional boundaries Correct as of 10-1-62.

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TABLE 2

TOTAL ELECTRIC POWER REQUIREMENTS AT LOCATIONS OF CHEMICAL MANUFACTURING PLANTS OF PETROLEUM & NATURAL GAS INDUSTRIES
AS OF JANUARY 1, 1961
(Including New Construction By July 1, 1963)

(Figures Stated are in Kilowatt Hours Per Day)

	AT "SELF-CONTAINED" a/ FACILITIES			AT "NON-SELF-CONTAINED" FACILITIES b/			
OEP-OCD REGIONS	AS OF JANUARY 1, 1961	SCHEDULED FOR PRODUCTION BY JULY 1, 1963	TOTAL	AS OF JANUARY 1, 1961	SCHEDULED FOR PRODUCTION BY JULY 1, 1963	TOTAL	TOTAL
REGION 1							
Purchased From Utilities	241,950	72,000	313,950	1,212,840	49,280	1,262,120	1,576,070
Self-Contained *	-	-	-	764,000	-	764,000	764,000
Other Sources	-	-	-	-	-	-	-
TOTAL	241,950	72,000	313,950	1,976,840	49,280	2,026,120	2,340,070
REGION 2 & 3							
Purchased From Utilities	126,500	81,000	207,500	3,970,490	14,600	3,985,090	4,192,590
Self-Contained *	-	-	-	396,092	-	396,092	396,092
Other Sources	-	-	-	233	-	233	233
TOTAL	126,500	81,000	207,500	4,366,815	14,600	4,381,415	4,588,915
REGION 4							
Purchased From Utilities	198,803	37,700	236,503	1,735,000	-	1,735,000	1,971,503
Self-Contained *	25,590	-	25,590	1,735,100	-	1,735,100	1,760,690
Other Sources	-	-	-	-	-	-	-
TOTAL	224,393	37,700	262,093	3,470,100	-	3,470,100	3,732,193
REGION 5							
Purchased From Utilities	4,454,286	990,091	5,444,377	9,899,589	274,220	10,173,809	15,618,186
Self-Contained *	445,250	-	445,250	4,927,067	173,000	5,100,067	5,545,317
Other Sources	-	-	-	-	-	-	-
TOTAL	4,899,536	990,091	5,889,627	14,826,656	447,220	15,273,876	21,163,503
REGION 6							
Purchased From Utilities	83,710	816,000	899,710	106,821	-	106,821	1,006,531
Self-Contained *	50,100	-	50,100	632,564	-	632,564	682,664
Other Sources	-	-	-	8,122	-	8,122	8,122
TOTAL	133,810	816,000	949,810	747,507	-	747,507	1,697,317
REGION 7 & 8							
Purchased From Utilities	978,732	4,608	983,340	3,452,948	160,000	3,612,948	4,596,288
Self-Contained *	-	-	-	438,000	-	438,000	438,000
Other Sources	-	-	-	-	-	-	-
TOTAL	978,732	4,608	983,340	3,890,948	160,000	4,050,948	5,034,288
TOTAL UNITED STATES							
Purchased From Utilities	6,083,981	2,001,399	8,085,380	20,377,688	498,100	20,875,788	28,961,168
Self-Contained *	520,940	-	520,940	8,892,823	173,000	9,065,823	9,586,763
Other Sources	-	-	-	8,355	-	8,355	8,355
TOTAL	6,604,921	2,001,399	8,606,320	29,278,866	671,100	29,949,966	38,556,286

a/ A "Self-Contained" facility is defined as a chemical plant that can maintain continuity of operation (assuming availability of feed stocks and power requirements) independent of any other physical unit or facility.

b/ Data shown is for the overall facility, of which the non-self-contained chemical plant is only a part.

* Power generated within the plant.

TABLE 3

TOTAL AVERAGE NUMBER OF EMPLOYEES AT LOCATIONS OF
CHEMICAL MANUFACTURING PLANTS OF PETROLEUM & NATURAL GAS INDUSTRIES
AS OF JANUARY 1, 1961
(Including New Construction By July 1, 1963)

OEP-OCD REGIONS	AT "SELF-CONTAINED" a/ FACILITIES			AT "NON-SELF-CONTAINED" FACILITIES c/			TOTAL
	AS OF JANUARY 1, 1961	SCHEDULED FOR PRODUCTION BY JULY 1, 1963	TOTAL	AS OF JANUARY 1, 1961	SCHEDULED FOR PRODUCTION BY JULY 1, 1963	TOTAL	
REGION 1							
Operating	69	50	119	2,034	42	2,076	2,195
Maintenance	3	20	23	2,307	8	2,315	2,338
All Others b/	120	30	150	1,752	20	1,772	1,922
TOTAL	192	100	292	6,093	70	6,163	6,455
REGION 2 & 3							
Operating	136	60	196	4,264	172	4,436	4,632
Maintenance	61	60	121	4,689	217	4,906	5,027
All Others b/	132	80	212	3,075	103	3,178	3,390
TOTAL	329	200	529	12,028	492	12,520	13,049
REGION 4							
Operating	342	30	372	3,311	-	3,311	3,683
Maintenance	154	-	154	4,382	33	4,415	4,569
All Others b/	116	-	116	2,692	-	2,692	2,808
TOTAL	612	30	642	10,385	33	10,418	11,060
REGION 5							
Operating	2,955	210	3,165	13,983	490	14,473	17,638
Maintenance	2,273	146	2,419	13,694	335	14,029	16,448
All Others b/	1,946	121	2,067	9,028	563	9,591	11,658
TOTAL	7,174	477	7,651	36,705	1,388	38,093	45,744
REGION 6							
Operating	214	36	250	678	-	678	928
Maintenance	138	20	158	339	-	339	497
All Others b/	155	35	190	176	-	176	366
TOTAL	507	91	598	1,193	-	1,193	1,791
REGION 7 & 8							
Operating	1,328	14	1,342	3,787	115	3,902	5,244
Maintenance	1,172	6	1,178	2,723	45	2,768	3,946
All Others b/	1,246	3	1,249	3,013	85	3,098	4,347
TOTAL	3,746	23	3,769	9,523	245	9,768	13,537
TOTAL UNITED STATES							
Operating	5,044	400	5,444	28,057	819	28,876	34,320
Maintenance	3,801	252	4,053	28,134	638	28,772	32,825
All Others b/	3,715	269	3,984	19,736	771	20,507	24,491
TOTAL	12,560	921	13,481	75,927	2,228	78,155	91,636

a/ A "Self-Contained" facility is defined as a chemical plant that can maintain continuity of operation (assuming availability of feed stocks and power requirements) independent of any other physical unit or facility.

b/ Includes supervisory, clerical etc.

c/ Data shown is for the overall facility, of which the non-self-contained chemical plant is only a part.

TABLE 4

PRODUCTION CAPACITY FOR (AS OF JANUARY 1, 1961) AND 1960 ACTUAL PRODUCTION OF SELECTED CHEMICALS MANUFACTURED IN PETROLEUM & NATURAL GAS INDUSTRY FACILITIES

NATIONAL PETROLEUM COUNCIL'S SURVEY OF CHEMICAL MANUFACTURING FACILITIES OF PETROLEUM & NATURAL GAS INDUSTRIES

	NUMBER OF FACILITIES PRODUCING OR SCHEDULED FOR PRODUCTION	SPECIFICATION PURITY OF PRODUCT (% Range)	UNIT OF MEASURE	ACTUAL PRODUCTION 1960	PRODUCTION CAPACITY JANUARY 1, 1961 (Annual Rate)	NEW CAPACITY SCHEDULED FOR PRODUCTION BY JULY 1, 1963 (Annual Rate)		WHERE CHEMICALS CO-PRODUCED; COMMONLY PRODUCED WITH	WHERE CHEMICALS ALTERNATELY PRODUCED; COMMONLY PRODUCED ALTERNATELY TO
	5	99+	LBS.	337,898,000	547,700,000	-	1.	PHENOL, HYDROGEN PEROXIDE	-
	6	95-99.9	GALS.	91,465,753	108,500,000	14,385,000	2.	ETHYL ETHER	ISOPROPYL ALCOHOL
	4	-	LBS.	380,414,529	466,250,000	-	3.	-	-
	31	98-99.9	GALS.	271,858,077	413,635,872	145,883,300	4.	TOLUENE, XYLENES-MIXED, HEXANES	-
	12	98-99	TONS	871,476	1,173,054	15,000	5.	BUTYLENE, BUTANE # 1 & # 2	BUTYLENES
	4	95-98	GALS.	8,234,338	43,300,000	-	6.	BUTADIENE, BUTENE # 2	-
	3	95-96	GALS.	2,217,214	120,200,000	-	7.	BUTADIENE, BUTENE # 1	-
	18	VARIABLE	GALS.	505,415,449	669,107,855	-	8.	BUTADIENE, PROPYLENE	BUTADIENE, BUTENE # 1, BUTENE # 2
	3	VARIABLE	LBS.	1,106,707	1,312,707	-	9.	-	-
	4	VARIABLE	LBS.	6,285,734	6,502,734	-	10.	-	-
	3	90-99.6	LBS.	N.A.	165,000,000	245,000,000	11.	-	-
	5	98-99.5	GALS.	58,703,011	75,685,000	40,000,000	12.	HEXANES	-
	3	90-100	LBS.	25,344,620	52,441,000	-	13.	ETHYLENE GLYCOL	-
	3	-	LBS.	32,706,518	39,223,937	-	14.	-	PROPYLENE TETRAMER
	5	95-99	GALS.	N.A.	18,625,000	94,260,000	15.	-	-
	15	VARIABLE	LBS.	1,989,000,893	2,466,633,000	459,200,000	16.	PROPYLENE	-
	3	VARIABLE	LBS.	75,658,066	109,222,000	43,000,000	17.	ETHYLENE OXIDE	-
	4	95-100	LBS.	313,906,892	436,014,000	-	18.	-	ETHYLENE OXIDE, PROPYLENE GLYCOL
	5	99+	LBS.	142,485,413	294,809,000	110,300,000	19.	ETHYLENE DICHLORIDE	ETHYLENE GLYCOL
	14	VARIABLE	GALS.	21,793,548	104,956,000	6,694,680	20.	HEXANES, BENZENE, TOLUENE	HEXANES
	5	94-100	GALS.	11,806,250	28,092,000	8,967,000	21.	-	PROPYLENE TRIMER & TETRAMER
	20	VARIABLE	GALS.	106,058,440	191,283,000	41,322,110	22.	BENZENE, HEPTANES, CYCLOHEXANE	HEPTANES
	24	70-99	MMCF	79,091	103,858	13,338	23.	BENZENE, TOLUENE, XYLENES-MIXED	-
	5	VARIABLE	GALS.	66,106,644	95,650,000	2,200,000	24.	BUTYLENE	ISO-AMYLENES
	13	VARIABLE	LBS.	20,614,803	24,109,637	4,800,000	25.	-	-
	4	VARIABLE	LBS.	N.A.	10,000,000	300,000,000	26.	-	-
	8	VARIABLE	LBS.	18,510,271	24,808,535	-	27.	OTHER ACID RANGES	-
	5	98.5-99.6	LBS.	81,223,826	104,099,000	64,475,000	28.	-	-
	5	VARIABLE	LBS.	34,610,000	46,550,000	61,800,000	29.	-	DIMETHYL TEREPHTHALATE, ISO. & TEREPHTHALIC ACID
	5	99-100	LBS.	79,232,546	95,990,472	104,073,000	30.	-	-
	5	99-100	LBS.	N.A.	220,000,000	147,750,000	31.	-	ETHYLENE
	23	VARIABLE	LBS.	1,838,995,447	2,337,784,466	645,000,000	32.	ETHYLENE, BUTYLENE	-
	14	VARIABLE	GALS.	95,434,253	142,890,254	-	33.	PROPYLENE TRIMER	HEPTENES, DIISOBUTYLENE, PROPYLENE TRIMER
	8	89-99.7	GALS.	64,044,540	90,206,000	6,000,000	34.	PROPYLENE TETRAMER	HEPTENES, PROPYLENE TETRAMER
	5	99+	LBS.	244,297,930	340,000,000	150,000,000	35.	-	ETHYL BENZENE
	43	99+	LONG TONS	566,077	945,145	47,670	36.	-	-
	5	VARIABLE	TONS	303,147	403,925	-	37.	-	-
	29	92-99.9	GALS.	212,023,562	390,310,512	155,500,000	38.	BENZENE, XYLENES-MIXED	-
	25	84-100	GALS.	237,033,032	432,020,000	135,500,000	39.	BENZENE, TOLUENE, XYLENES-ORTHO & PARA	-
	11	86-99	GALS.	22,525,672	42,027,156	47,400,000	40.	BENZENE, TOLUENE, XYLENES-MIXED	-
	7	98-99	LBS.	209,448,207	240,533,947	119,300,000	41.	TOLUENE, XYLENES-MIXED, XYLENES-ORTHO	-

TABLE 5

ENUMERATION OF ALL CHEMICALS SURVEYED-
INDICATING PRINCIPAL MATERIALS CONSUMED
NATIONAL PETROLEUM COUNCIL'S SURVEY OF CHEMICAL
MANUFACTURING FACILITIES OF PETROLEUM & NATURAL GAS INDUSTRIES

CHEMICALS	PRINCIPAL MATERIALS CONSUMED IN PRODUCTION OF CHEMICALS
Acetone	Caustic Soda, Cumene, Isopropyl Alcohol
Acetylene	Calcium Carbide
Acrylonitrile	Ammonia, Propylene, Propane
Alcohols, Normal	Ethylene, Caustic Soda, Natural Gas
Alkylate, Detergent	Benzene, Propylene, Caustic Soda
Benzene	Toluene, Naphtha Cut, Straight Run Gasoline
Butadiene	Butylenes, Butane
Butene 1	Butylenes, Butane
Butene 2	Butylenes, Butane
Butyl Alcohol, Secondary	Caustic Soda, Sulphuric Acid, Butylenes
Butylenes	Butane, Butylenes, Gas Oil
Caustic Soda	Sodium Chloride
Chlorine	Sodium Chloride
Cresols	Spent Caustic, Sulphuric Acid
Cresylic Acid, Refined	Caustic Soda, Sulphuric Acid
Cumene	Benzene, Propylene
Cyclohexane	Hexanes
Dicyclopentadiene	Gas Oil, Naphtha
Diethylene Glycol	Ethylene
Diisobutylene	Butylenes
Dimethyl Terephthalate	Methanol, Xylenes
Epichlorohydrin	Caustic Soda, Chlorine
Ethanolamines	Ammonia
Ethyl Benzene	Straight Run Gasoline, Benzene, Ethylene
Ethyl Chloride	Ethylene, Hydrogen Chloride
Ethyl Ether	Ethylene
Ethylene	Gas Oil, Naphtha, Refinery Gases
Ethylene Dichloride	Ethylene, Chlorine
Ethylene Glycol	Ethylene
Ethylene Oxide	Ethylene, Chlorine
Formaldehyde	Methanol

CHEMICALS	PRINCIPAL MATERIALS CONSUMED IN PRODUCTION OF CHEMICALS
Glycerine	Caustic Soda
Heptanes	Natural Gas, Pentanes
Heptenes	Propylene, Butylene
Hexanes	Pentane, Mixed Hexanes, Straight Run Gasoline
Hydrogen	Straight Run Gasoline, Natural Gas, Naphtha
Hydrogen Peroxide	Caustic
Iso-Amylenes	Light Catalytic
Iso-Butylene	Butylenes
Isophthalic Acid	Meta Xylenes
Isoprene	Gas Oil, Naphtha
Isopropyl Alcohol	Caustic Soda, Propylene, Sulphuric Acid
Maleic Anhydride	Benzene, Butylenes
Mercaptans	Caustic Soda, Mixed Crude
Methyl-Ethyl Ketone	Butyl Alcohol Secondary
Methyl-Isobutyl-Ketone (MIBK)	Caustic Soda
Naphthalene	Crude Coal Tar, Light Cycle Gas Oil
Naphthenic Acids	Caustic Soda, Sulphuric Acid
Nonyl Phenol	Propylene, Phenol
Oxo-Alcohols	Polymers, Natural Gases, Hydrogen
Phenol	Benzene, Propylene
Phthalic Anhydride	Naphthalenes, Ortho Xylenes
Polybutenes	Butane, Butenes
Polyethylene	Ethylene
Polypropylene	Propane, Propylene
Polystyrene	Styrene
Polyvinyl Chloride	Polymers, Phthalic
Propylene	Gas Oil, Caustic Soda, Propylene, Propane
Propylene Oxide	Chlorine, Lime
Propylene Tetramer	Propylene, Propane, Phosphoric Acid
Propylene Trimer	Propylene, Propane
Styrene	Benzene, Propane
Sulfur	Hydrogen Sulfide, Acid Gas
Sulfuric Acid (100% Basis)	Sulfur, Hydrogen Sulfide
Terephthalic Acid	Methanol, Xylenes
Toluene	Benzene, Naphtha Cut, Straight Run Gasoline
Vinyl Chloride	Ethylene Dichloride
Xylenes-Meta	Mixed Xylenes
Xylenes-Mixed	Straight Run Gasoline, Naphtha Cut
Xylenes-Ortho	Mixed Xylenes, Straight Run Gasoline
Xylenes-Para	Mixed Xylenes, Straight Run Gasoline

Appendix A

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

C
O
P
Y

December 19, 1960

Dear Mr. Hallanan:

The National Plan for Civil and Defense Mobilization delegates to the Department of the Interior the responsibility for planning and directing Federal actions during an emergency in the production of petrochemicals by the petroleum and gas industries In order to discharge this responsibility, the Department must have up-to-date accurate information on the location, products produced and production capacity of plants producing these chemicals. We believe that authoritative data on petrochemical production capacity can best be obtained from the petroleum industry through the National Petroleum Council.

It is, therefore, requested that the National Petroleum Council undertake a study to determine production capacity of petrochemicals in the United States and submit a report covering its study, including any comments and recommendations which the Council believes will be helpful.

The study should cover all chemicals, except carbon black, ammonia and synthetic rubber, made in plants owned or operated by petroleum and gas companies or in petroleum facilities, including those jointly owned companies where 50% or greater ownership is in the hands of petroleum and gas companies. The study should include synthetic rubber raw materials, sulfur and sulfuric acid of petroleum or gas origin. We would like to have production capacity as of January 1, 1961, additional production capacity already announced, actual 1960 production, raw materials requirements, purchased electric power requirements, manpower requirements and plant location by latitude and longitude. The Office of Oil and Gas will supply any additional information required to define the scope and detail of the request.

At present, there are no comprehensive or accurate data available in this field, which is of great importance to defense mobilization planning. I would, therefore, appreciate and welcome the Council's early report on this subject.

Sincerely yours,

/S/ Fred A. Seaton

Secretary of the Interior

Mr. Walter S. Hallanan
Chairman, National Petroleum Council
1625 K Street, N. W.
Washington, D. C.

NATIONAL PETROLEUM COUNCIL

COMMITTEE ON PETROCHEMICALS (1961)

CHAIRMAN

Bruce K. Brown, Chairman
of the Executive Committee
Murphy Corporation

GOVERNMENT CO-CHAIRMAN

R. Phillip Wheeler
Office Of Oil and Gas
U. S. Department of the Interior

SECRETARY

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National Petroleum Council

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Reid Brazell, President and General Manager
Leonard Refineries, Inc.

E. D. Brockett, President
Gulf Oil Corporation

Paul Endacott, Vice Chairman of the Board
Phillips Petroleum Company

R. G. Follis
Chairman of the Board
Standard Oil Company of California

Jake L. Hamon
Dallas, Texas

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Howell Refining Company

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Chairman of the Board
El Paso Natural Gas Company

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Texaco Inc.

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The Pure Oil Company

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Standard Oil Company (N. J.)

Monroe E. Spaght, President
Shell Oil Company

Charles E. Spahr, President
The Standard Oil Company (Ohio)

Henderson Supplee, Jr.
President
The Atlantic Refining Company

TECHNICAL SUBCOMMITTEE

TO THE

NATIONAL PETROLEUM COUNCIL'S

COMMITTEE ON PETROCHEMICALS (1961)

CHAIRMAN

Thomas L. Cubbage
Phillips Chemical Company

GOVERNMENT CO-CHAIRMAN

R. Phillip Wheeler
Office of Oil and Gas
U. S. Department of the Interior

ASSISTANT TO CHAIRMAN

Harold R. Legatski
Phillips Chemical Company

Dr. J. W. Bertetti
Crown Central Petroleum Corporation

Charles E. Bonine
The Atlantic Refining Company

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The Pure Oil Company

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Cities Service Research and Development Company, Inc.

Jesse L. Owens
El Paso Natural Gas Products Company

Dr. Ernest M. Peres
The Standard Oil Company (Ohio)

Dr. R. I. Stirton
California Chemical Company

J. E. Wood, III
Enjay Chemical Company

SECRETARY

Vincent M. Brown
National Petroleum Council

Appendix D

NATIONAL PETROLEUM COUNCIL

(Established by the Secretary of the Interior)

1625 K STREET, N. W.

WASHINGTON 6, D. C.

COPY

November 22, 1961

TO ALL PETROLEUM AND NATURAL GAS COMPANIES
MANUFACTURING CHEMICALS

Gentlemen:

The National Plan for civil and defense mobilization delegates to the U. S. Department of the Interior, the responsibility for planning and directing Federal action during an emergency in the production of chemicals by the petroleum and natural gas industries.

To enable the Department of Interior to discharge this responsibility, the Secretary of the Interior has requested the National Petroleum Council to obtain up-to-date accurate information on the location, products produced, and the production capacity of all plants producing these chemicals in the United States.

Accordingly, the National Petroleum Council has agreed to make the requested study, and the Committee on Petrochemicals was established to carry out this assignment. The Technical Subcommittee was, in turn, asked to make a survey of all oil and gas companies manufacturing chemicals in order to obtain the needed data.

Enclosed are the questionnaire forms and instructions, designed by the Technical Subcommittee to accomplish the above objectives. The study covers all chemicals except carbon black, ammonia and synthetic rubber made in plants owned or operated by petroleum and natural gas companies, or in petroleum facilities, including those jointly owned companies where 50% or greater ownership is in the hands of petroleum and gas companies. The study also includes raw materials used in synthetic rubber production, as well as sulfur and sulphuric acid of petroleum or gas origin.

The information requested by the Government will be vital to bring order out of chaos during any post-attack or disaster period. Your cooperation in completing and returning these questionnaires promptly will be deeply appreciated since the task of compiling the information and preparing the necessary disaster plans are of urgent importance.

All data and information furnished by you will be kept strictly confidential, except that it will be available to Governmental Defense Agencies for use in classified studies. All processing and tabulating of questionnaires will be done by the Council staff after coding the filled-in forms. Only industry group totals will appear in the final report of the Subcommittee. In no event will data be reported on chemicals manufactured by less than three producers.

Thank you sincerely for your cooperation and assistance in this important effort.

Sincerely yours,

T. L. Cubbage, Chairman
Technical Subcommittee
NPC Committee on Petrochemicals

NATIONAL PETROLEUM COUNCIL'S PETROLEUM AND NATURAL GAS INDUSTRIES CHEMICAL PRODUCTION SURVEY (1961)

QUESTIONNAIRE FORMS

COVER PAGE

Please clip this cover page to the front of all your forms submitted. *This is the only place where your company name will appear* and will be removed from the detailed reports, at the office of the National Petroleum Council, after the forms have been company code numbered.

Code: _____

No. of Plant Locations: _____

Reporting Company: _____

Address: _____

_____

_____

Person who should be contacted if questions arise: _____

Appendix D (Cont'd)

COMMENTS AND INSTRUCTIONS RELATIVE TO QUESTIONNAIRE FORMS COVERING THE NATIONAL PETROLEUM COUNCIL'S SURVEY OF CHEMICAL MANUFACTURING FACILITIES OF THE PETROLEUM AND NATURAL GAS INDUSTRIES

1. This survey is designed to obtain information with respect to chemicals (excluding carbon black, ammonia and synthetic rubber) which are manufactured in plants owned or operated by petroleum and natural gas companies, or in petroleum facilities, including those jointly owned companies where 50% or greater ownership is in the hands of petroleum and natural gas companies.

   For the purpose of this survey, the 86 chemicals on which reports are to be submitted were selected on the following basis—those substances that meet three tests:

   (a) Commercial quantities of recognized chemicals which move in trade.

   (b) Of a quality meeting commercial specifications for chemical use, and,

   (c) Manufactured by oil and natural gas companies.

2. Fill out one copy of both Tables 1 and 2, for each plant location owned or operated by your company. On Table 1, Section A, state the precise location of the plant being reported in the following manner:

   (a) Attach a small map (8½" x 11") showing landmarks adjacent to or in the vicinity of the plant, and mark on it the precise boundaries of the plant.

   (b) Give the street address and name the boundary streets between which the plant lies. For an installation outside of incorporated areas, locations should be given by reference to bench marks on a road map which can be identified by government cartographers; for example:

   Located north of Alexandria on Route 1,
   2½ miles north of Waverly Road.

   Locations by "Section", "Township" and "Range" are not applicable in all areas.

   (c) If you have such information available, give the location of the plant stated in terms of latitude and longitude in degrees, minutes and seconds.

3. On Table 1, Section B, please indicate the total electrical power requirements for the plant location on the more applicable of two bases. Line 1 is for a "self-contained" facility. A "self-contained" facility is defined as a chemical plant that can maintain continuity of operation (assuming availability of feed stocks and power requirements) independent of any other physical unit or facility. Line 2 is for a chemical plant which is part of an over-all installation such as a refinery and/or a natural gasoline plant. In this case state the total power requirements for the overall installation or complex including the chemical plant and identify the type of overall installation such as "refinery" or "natural gasoline plant" or any other. State requirements in terms of kilowatt hours per day, and whether the power is purchased from public utilities, self-generated or from other sources (i.e. purchased from a private industrial company).

4. On Table 1, Section C, indicate the average number of employees working at the plant location and whether such employees are operating, maintenance, or other supervisory and clerical personnel. Answer the manpower requirement on the same basis as the electrical power requirements in (3).

5. On Table 1, Section D, please indicate the date of first chemical production at this plant location. In addition, please state whether or not any lube oil additives are made at this plant location.

6. On Table 1, Section E, Column 1, are listed 86 chemicals, data on which is being requested in this survey. With respect to these chemicals, quantities should be specified on a 100% purity basis; but indicate in Column 1 the specification purity of the product produced. In the event several purities are produced, give the details in the space provided at the bottom of Table 1.

   In Column 2, cross-reference any of the listed chemicals which are manufactured at this plant on an alternating or a co-product basis. In the cross-reference, insert the same letter of the alphabet for each chemical co-produced and indicate "alternate" or "co-product." For example, if a chemical facility is used to make alternately during the year benzene, toluene and mixed xylenes, please indicate by the designation "(a) alternate" on lines 8, 81 and 84.

   In Column 3, state annual rated production capacity as of January 1, 1961, for each of the chemicals manufactured in this plant in terms of the unit of measure indicated. Report this annual rated productive capacity on a full 24-hour day, 365 days per year basis, with *only* maintenance and repair interruptions, i.e. as if the particular chemical had been produced throughout the entire year.

   In Column 4, indicate any new capacity in the plant which is scheduled to commence production by July 1, 1963. A separate questionnaire should be completed to cover new production capacity which will be in operation by July 1, 1963, at locations where there is no capacity existing as of January 1, 1961. Indicate by footnote anticipated date production will go on stream.

   In Column 5, state *actual* production of each chemical produced for the twelve-month period beginning January 1, 1960, and ending December 31, 1960. Include entire production of any of the chemicals listed regardless of whether they are end-products for this facility or whether they are used all or in part as feed stocks for some other process in the facility.

7. On Table 2, list in Column 1 the principal *materials consumed* at the plant location which enter *directly* into the production of the products manufactured at the plant, and which you have itemized on Table 1.

   If the chemical facility is not self-contained and is, for example, part of a petroleum refinery, do not list the refinery crude as a "principal material consumed." Instead, give the feed stock or stocks *as near down-stream as possible* to the inlet of the chemical facility.

   In Columns 2, 3 and 4 state normal quantity requirements per calendar day of operation and a description of the quality of such material.

   In column 5, Table 2, indicate by number the chemical product shown on Table 1 for which the principal material is utilized. If a given principal material is used to make more than one of the chemical products listed for this plant, you would put in column 5 all of the appropriate numbers signifying the products as listed on Table 1.

8. Please attach one of the cover pages, being sent herewith, to your report forms. The cover page only will show your company name. Filled-in forms should be returned to Mr. Vincent M. Brown, National Petroleum Council, 1625 K Street, N. W., Washington 6, D. C. A code number will be assigned for your company, and the detailed forms will carry only the code number, the cover page having been previously removed. From this point on, tabulating will be done on the basis of code number only.

   The individual plant and company data furnished for these questionnaires will be treated as strictly confidential, except that it will be available to Government Defense Agencies for their own use in classified studies. Only customary industry group totals will be published.

9. If you should have any further questions, please contact Mr. Vincent M. Brown of the office of the National Petroleum Council, 1625 K Street, N. W., Washington 6, D. C., Telephone No. Executive 3-5167.

TABLE 1

CODE_____

Appendix D (Cont'd)

NATIONAL PETROLEUM COUNCIL'S SURVEY OF CHEMICAL MANUFACTURING FACILITIES OF PETROLEUM & NATURAL GAS INDUSTRIES

NOTE: Copies of this form should be used to report requested data for each plant location at which chemicals are manufactured. Please report on each plant location separately. Please read comments and instructions before filling in data.

SECTION A. PLANT LOCATION:

State_____ County_____ City_____

Section_____ Township_____ Range_____

Precise Location: (See Instructions) _____

SECTION B. INDICATE TOTAL ELECTRIC POWER REQUIREMENTS FOR THIS LOCATION (In KW/Hr./Day):

	PURCHASED FROM UTILITIES	SELF-SUPPLIED	OTHER SOURCES	TYPE OF OVERALL FACILITY CONTAINING NON-SELF-CONTAINED CHEMICAL PLANT
1. "Self-contained" facility				XXXXX
2. Facility is not "self-contained"				

SECTION C. AVERAGE NUMBER OF EMPLOYEES AT THIS LOCATION:

	OPERATING	MAINTENANCE	ALL OTHERS (SUPERVISORY, CLERICAL, ETC.)
1. "Self-contained" facility			

SECTION D.

1. Date of first chemical production at this plant location:_____

2. Are any lube oil additives made at this plant location? _____

(COLUMN 1) SECTION E. ITEMS	SPECIFICATION PURITY OF PRODUCT PRODUCED	UNIT OF MEASURE	(COLUMN 2) CROSS-REFERENCE CO-PRODUCTS AND THOSE ALTERNATELY PRODUCED	(COLUMN 3) PRODUCTION CAPACITY JANUARY 1, 1961	(COLUMN 4) NEW CAPACITY AT THIS LOCATION SCHEDULED FOR PRODUCTION BY JULY 1, 1963 (ANNUAL RATE)	(COLUMN 5) ACTUAL PRODUCTION FOR YEAR 1960
1. Acetaldehyde		lbs.				
2. Acetone		lbs.				
3. Acetonitrile		lbs.				
4. Acetylene		lbs.				
5. Acrylonitrile		lbs.				
6. Alcohols, Normal: (Specify) a. Ethanol		gal.				
b. Methanol		gal.				
c.						
d.						
e.						
7. Alkylate, Detergent		lbs.				
8. Benzene		gal.				
9. Benzoic Acid		lbs.				
10. Bis Phenol A		lbs.				
11. Butadiene		tons				
12. Butene 1		gal.				
13. Butene 2		gal.				
14. Butyl Alcohol, Secondary		lbs.				
15. Butylenes		gal.				
16. Caustic Soda		tons				
17. Chlorine		tons				
18. Cresols		lbs.				
19. Cresylic Acid, refined		lbs.				
20. Cumene		lbs.				
21. Cyclohexane		gal.				
22. Dicyclopentadiene		lbs.				
23. Diethylene Glycol		lbs.				
24. Diisobutylene		lbs.				
25. Dimethyl Terephthalate		lbs.				
26. Durene		lbs.				
27. Epichlorohydrin		lbs.				
28. Ethanolamines: (Specify) a.		lbs.				
b.						
c.						
d.						
29. Ethyl Acetate		lbs.				
30. Ethyl Benzene		gal.				
31. Ethyl Chloride		lbs.				
32. Ethyl Ether		lbs.				
33. Ethylene		lbs.				
34. Ethylene Dichloride		lbs.				
35. Ethylene Glycol		lbs.				
36. Ethylene Oxide		lbs.				
37. Formaldehyde		lbs.				
38. Glycerine		lbs.				
39. Heptanes		gal.				
40. Heptenes		gal.				
41. Hexanes		gal.				
42. Hexanol, 2 Ethyl		lbs.				
43. Hydrogen		MMCF				
44. Hydrogen Cyanide		lbs.				
45. Hydrogen Peroxide		lbs.				
46. Iso-Amylenes		gal.				
47. Iso-Butylene		gal.				
48. Isophthalic Acid		lbs.				
49. Isoprene		lbs.				
50. Isopropyl Alcohol		gal.				
51. Maleic Anhydride		lbs.				
52. Mercaptans: (Specify) a.		lbs.				
b.						
c.						
d.						
53. Methyl Chloride		lbs.				
54. Methyl-Ethyl Ketone		lbs.				
55. Methyl-Isobutyl-Ketone (MIBK)		lbs.				
56. Naphthalene		lbs.				
57. Naphthenic Acids (Specify Acid Number) a.		lbs.				
b.						
c.						
d.						
58. Nonyl Phenol		lbs.				
59. Oxo-Alcohols: (Specify) a.		lbs.				
b.						
c.						
d.						
e.						
60. Pentenes, Normal		gal.				
61. Phenol		lbs.				
62. Phthalic Anhydride		lbs.				
63. Polybutenes		lbs.				
64. Polyethylene		lbs.				
65. Polypropylene		lbs.				
66. Polystyrene		lbs.				
67. Polyvinyl Chloride		lbs.				
68. Propylene		lbs.				
69. Propylene Glycol		lbs.				
70. Propylene Oxide		lbs.				
71. Propylene Tetramer		gal.				
72. Propylene Trimer		gal.				
73. Sodium		lbs.				
74. Styrene		lbs.				
75. Sulfur		long tons				
76. Sulfuric Acid (100% basis)		tons				
77. TEL		lbs.				
78. TEML		lbs.				
79. Terephthalic Acid		lbs.				
80. TML		lbs.				
81. Toluene		gal.				
82. Vinyl Chloride		lbs.				
83. Xylenes-Meta		gal.				
84. Xylenes-Mixed		gal.				
85. Xylenes-Ortho		gal.				
86. Xylenes-Para		lbs.				

ENTER ADDITIONAL CLARIFYING OR SUPPORTING INFORMATION HERE:

TABLE 2

CODE_____

PRINCIPAL MATERIALS CONSUMED WHICH ENTER DIRECTLY INTO THE PRODUCTION OF THE CHEMICAL PRODUCTS MANUFACTURED AT THIS PLANT LOCATION

(COLUMN 1) PRINCIPAL MATERIALS ITEMS	(COLUMN 2) UNIT OF MEASURE	(COLUMN 3) NORMAL REQUIREMENTS PER CALENDAR DAY	(COLUMN 4) DESCRIPTION OF QUALITY	(COLUMN 5) PRODUCT OR PRODUCTS (AS SHOWN IN TABLE 1) IN WHICH MATERIAL IS UTILIZED (REFER BY USING NUMBERS SHOWN IN TABLE 1)
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				