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DEVELOPMENT OF THE PETROCHEMICAL INDUSTRY IN TURKEY[1]

by

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1. INTRODUCTION

The aim of this report is to give a brief description of Petkim Petrokimya A.S., to outline the incentives provided to the investors by the State and to describe the first Yarimca-Kocaeli petrochemical complex, comprising 14 units some of which have been mechanically completed and have either gone on stream or are ready for start-up operations, together with the second Aliaga-Izmir petrochemical complex for which great efforts are being given to provide the foreign currency element of the investment.

2. PETKIM PETROKIMYA A.S.

Petkim Petrokimya A.S. which had been founded by the Turkish Petroleum Co. Inc. and the State Pension Fund, has been entrusted with the task of establishing the petrochemical industry in Turkey.

With the participation of the Armed Forces Mutual Assistance Fund, the initial capital of the company amounting to 250 million Turkish Pounds has been divided among the shareholders as follows:

	TL	%
The Turkish Petroleum Co. Inc.	137,470,000	55
The State Pension Fund	62,500,000	25
The Armed Forces Mutual Assistance Fund	50,000,000	20
Private shareholders	30,000	-
	250,000,000	100

On April 26th, 1968, as a result of an extra-ordinary general meeting, equity capital has been augmented to 500 TL., and the corresponding shares are shown below:

	TL	%
The Turkish Petroleum Co. Inc.	275,000,000	55
The State Pension Fund	125,000,000	25
The Armed Forces Mutual Assistance Fund	100,000,000	20
	500,000,000	100

On the other hand, necessary actions have been taken in the year 1969 to further augment the equity capital to 1 thousand million TL so as to be effective in 1970.

3. INCENTIVES PROVIDED BY THE STATE

In order to realize the investments during the Second Five Year Development Plan period, the State recognizes great possibilities for investors and encourages the investments in all possible directions.

For the realization and encouragement of the first Yarimca-Kocaeli petrochemical complex, the State has provided certain incentives to the company, which can be studied in two parts; incentives given under the Petroleum Act and the Law No.933.

3.1 Petroleum Act

By virtue of the Petroleum Act, machinery and equipment and the related spare parts, raw materials and intermediates required for the first Yarimca-Kocaeli petrochemical complex which is at the stage of construction and erection can be imported into Turkey free of any import tax.

In addition the said law gives the investors the right of selecting a free and reasonable rate of depreciation.

All units within the complex which are being installed by Petkim, are under the scope of Petroleum Act, with the exception of the chlorine unit.

Since the second Aliaga-Izmir petrochemical complex is at the stage of pre-project studies, no application has been submitted to the Petroleum Department to receive the petroleum certificate.

3.2 Encouragement incentives

In order to take advantage of the encouragement incentives for investment goods, raw and auxiliary materials required for the operation of Petkim Yarimca-Kocaeli complex in the light of Law No.933, Article 2, Item B and the decision of Council of Ministers dated 25 November 1968 No.6/10999 in connexion with the implementation, co-ordination and following-up of 1969 year programme and the supplementary decision dated 11 March 1969, No.6/11497 to the above mentioned decision of the Council of Ministers, Petkim's application submitted to the State Planning Organization has been approved.

As a result, having been granted with such a certificate, Petkim has been given the right to import the investment goods required by the units, including the chlorine, until 1972, and the raw materials and auxiliary

chemicals within the next two years' period, free of any custom tax and duties.

Furthermore, the rest of the units for which any expenditure has not been committed, are also allowed to take advantage of 80 per cent investment allowance.

4. THE PLAST YARIMCA-KOCAELI PETROCHEMICAL COMPLEX

The units comprising this complex to be realized in three phases and their present situation have been outlined below:

4.1 First phase units

Unit	Capacity (MTPA)	Remarks
1. Naphtha steam cracking	30,000	start-up operation has commenced
2. Polyethylene	12,000	under erection, to be completed in the very near future and will be commissioned and started-up this year
3. Vinyl chloride monomer (VCM)	27,300	under erection, to be completed in the very near future and will be commissioned and started-up this year
4. Polyvinyl chloride (PVC)	26,000	under erection, to be completed in the very near future and will be commissioned and started-up this year
5. Chlorine-alkali	18,500 chlorine 20,300 caustic	under erection, to be completed in the very near future and will be commissioned and started-up this year
6. Dodecyl benzene (DDB)	10,000	construction and erection has not started yet, the unit will be commissioned at the end of 1970

The related agreements in connexion with these units have been completed and the question of financing has been solved.

4.1.1 First phase expansion units

The rapid development of the market has necessitated the expansions of all the first phase units except DDR, without having ever completed their construction and erection.

(a) Naphtha steam cracking expansion unit

Construction and erection of this unit have already started and it is expected to be commissioned and started up by the end of 1971. The problem of financing has been solved.

(b) Polyethylene expansion unit

The engineering agreement for this expansion unit having a nominal capacity of 15,000 MTPA has been initialled and will be finalized very soon.

(c) Vinyl chloride monomer (VCM) expansion unit

The engineering agreement for this expansion unit having a capacity of 27,500 MTPA has also been initialled. Efforts are being made to finance this project.

(d) Polyvinyl chloride (PVC) expansion unit

The engineering agreement for this expansion unit having a capacity of 30,000 MTPA has also been initialled. Efforts are being made to finance this project.

(e) Chlorine-alkali expansion unit

The estimated project cost of this unit having a capacity of 18,500 MTPA chlorine and 20,000 MTPA caustic soda is $ 2 million. Negotiations are being carried out for the engineering agreement of the expansion. Efforts are being made to finance this project.

4.2 Second phase units

(a) Carbon black unit

The estimated project cost of this unit having a capacity of 30,000 MTPA is $ 3.5 million. License and know-how agreements in connection with this project has already been signed. Engineering tenders are expected.

(b) Styrene unit

Technical and economical difficulties arisen in the course of the which had

sitated the establishment of this unit in the second Aliaga-Izmir petrochemical complex with a capacity of 46,550 MTPA which had formerly been planned to be realized within the first Yarimca-Kocaeli petrochemical complex with a capacity of 25,000 MTPA.

Therefore the related discussions concerning this unit have been given in the Second Petrochemical Complex Report.

(c) Polystyrene unit

The estimated project cost of this unit having a capacity of 35,000 MTPA is $ 3.3 million. Efforts are being made to finance this project.

4.3 The third phase units

(a) Synthetic rubber units

Efforts are being made to finance this project comprised of the following units through the European Investment Bank (EIB):

Units	Capacity MTPA
butadiene extraction unit	33,555
styrene butadiene (SBR) unit	35,000
cis-polybutadiene (CBR) unit	13,500

The approximate project cost is $ 9 million. The European Investment Bank (EIB) has officially been approached to get the required investment loan and our company is, at present, looking forward to hear the results of their investigation.

(b) Acrylonitrile unit

This project may either be realized with a capacity of 10,000 or 20,000 MTPA. The estimated project cost of a 20,000 MTPA plant including interest is $ 7 million. Efforts are being made to finance this project.

(c) Caprolactam unit

The estimated project cost of this unit having a capacity of 25,000 MTPA is $ 10 million. Efforts are being made to finance this project.

(d) Polypropylene and acrylonitrile butadiene styrene (ABS) units

In the first Yarimca-Kocaeli petrochemical complex, it has been

initially planned to establish a 15,000 MTPA polypropylene and 10,000 MTPA ABS units.

Since a second polypropylene unit with a capacity of 35,000 MTPA is also planned to be established within the second Aliaga-Izmir petrochemical complex, and in case 20,000 MTPA acrylonitrile capacity is selected, the idea of establishing the polypropylene unit within the first Yarimca-Kocaeli petrochemical complex will probably be given up due to propylene deficit.

5. INVESTMENT DATA

5.1 Fixed investment and working capital

The total project investment of the complex comprised of 14 units, utilities and common plant facilities is calculated to be 2,621,373,000 TL.: total fixed investment and working capital being 2,326,624,000 and 294,749,000 TL. respectively.

5.2 Distribution of investment according to years

Construction and erection of all units comprising the complex will be completed by the end of 1974.

5.3 Complex flow diagram

Complex flow diagram (Table I) is given in the appendix.

6. PRODUCTS TO BE PRODUCED IN THE FIRST YARIMCA-KOCAELI PETROCHEMICAL COMPLEX

Products to be produced in the first petrochemical complex can be classified as follows:

Plastics raw materials

Polyethylene (LD)

Polyvinyl chloride (PVC)

Polystyrene

Polypropylene

Acrylonitrile-butadiene-styrene (ABS)

Synthetic fibre raw materials

Caprolactam

Acrylonitrile

Synthetic detergent raw materials

Dodecyl benzene (LDB)

Rubber raw materials

Styrene butadiene (SBR) rubber

Cis-polybutadiene (CBR) rubber

Carbon black

By-products

LPG

Fuel oil

Caustic soda

Ammonium sulphate

7. FACTORS NECESSITATING THE ESTABLISHMENT OF THE SECOND ALIAGA-IZMIR PETROCHEMICAL COMPLEX

It has been decided that the site on which the present first petrochemical complex is been constructred would be almost occupied by the units to be commissioned by the end of this year and units covered in the 1969 year programme which are under construction and 1970 year programme which will be started in the near future.

The technical and economical problems expected to arise as a result of further expansion of the present complex in the Marmara region which is one of the most concentrated centres of industrial development in Turkey and the rapid development of the market more than foreseen in the Second Five Year Development Plan period, make the establishment of a second complex having larger capacities necessary. Thus, enough land is planned to be provided for this purpose near the Izmir refinery which is under construction at present.

Starting from the assumption that all units comprising first and second petrochemical complexes would be on stream by the end of 1974 and 1975 respectively, it has been understood that for certain products the units would either reach full capacity in a few years time or there would be no marketing difficulties what so ever.

8. THE SECOND ALIAGA-IZMIR PETROCHEMICAL COMPLEX

The feasibility studies concerning the second petrochemical complex comprised prised of fourteen process units and the supporting utilities and common plant facilities which is planned to be realized in the Aliaga-Izmir region by Petkim Petrokimya A.S. has been completed by Badger Ltd., London, and the resultang optimum capacities of final product units are summarized below:

Final product units	Optimum capacity (MTPA)
1. Polyethylene (LD)	45,000
2. Polyethylene (HD)	30,000
3. Polypropylene	35,000
4. PVC	65,000
5. Ethylene oxide	46,000
6. Ethylene glycol	30,000
7. TEA	2,000
8. DMT	40,000
9. Phthalic anhydride	29,000

On the other hand, the capacities of the intermediate units which are dictated by the raw material requirements of the final product plants are also shown below:

Intermediate units	Capacity (MTPA)
10. Ethylene	200,310
11. Chlorine	62,650
12. VCM	94,500
13. Styrene	46,550
14. Aromatic separation	
P-xylene	27,270
O-xylene	27,710
benzene	82,830

9. INVESTMENT DATA

9.1 Total fixed investment and working capital

Total project investment calculated for the second Aliaga-Izmir petrochemical complex comprised of fourteen process units, utilities and common plant facilities is given below:

(x 10^6 Turkish Pound)

	Domestic	Foreign	Total
otal fixed investment	1,187.5	1,461,0	2,648.5
Working capital	313.2	61.5	374.7
Total project investment	1,500.7	1,522.5	3,023.2

9.2 Distribution of investment according to years

Total project investment calculated for the second Aliaga-Izmir petrochemical complex amounting to 3,023.2 x 10^6TL. is foreseen to be spent within the period of 1970-1974 during which the units will be commissioned in phases. The investment distribution table over five year period is given below. For detailed information, please refer to table II.

(x10^6 Turkish Pound)

	1970	1971	1972	1973	1974
Total project investment	178.1	475.2	830.6	940.1	599.3
Foreign	88.3	181.1	366.3	516.7	348.4
Domestic	89.8	294.1	464.3	423.4	250.9

9.3 Complex flow diagram

Complex flow diagram (table III) is given in the appendix.

10. PRODUCTS TO BE PRODUCED IN THE SECOND (ALIAGA-IZMIR) PETROCHEMICAL COMPLEX

Products to be produced in the second Aliaga-Izmir petrochemical complex can be classified as follows:

Plastics raw materials

Polyethylene (LD)

Polyethylene (HD)

Polyvinyl chloride (PVC)

Polypropylene

Synthetic fibre raw materials

Dimethyl terephthalate(DMT)

Chemicals

Ethylene oxide

Ethylene glycol

Phthalic anhydride

Tri-ethanolamine (TEA)

Benzene, Toluene, Xylene

By-products

LPG

Fuel oil

Caustic soda

HCl

Hydrogenated gasoline

11. DEMAND FOR PETROCHEMICALS IN TURKEY

In order to give an idea about the demand for petrochemicals for future years, up to 1980, table III/A and table III/B were prepared.

12. TENTATIVE PETROCHEMICAL PRODUCTION SCHEDULE FOR 1970

The following production of petrochemicals has been planned for Yarimca complex in 1970.

Naphtha feed	125,000 MT/year
End products	
Polyethylene	12,000 MT/year
PVC (emulsion)	7,000 MT/year
PVC (suspension)	19,000 MT/year
Caustic soda (50%)	41,000 MT/year
Side products	
High octane gasoline	30,600 MT/year
C_4 LPG	9,500 MT/year
Fuel oil No.4	6,000 MT/year
Propylene to LPG	20,000 MT/year

Table III.A

PROJECTED PETROCHEMICAL CAPACITIES IN INDIA (expressed in metric tons)

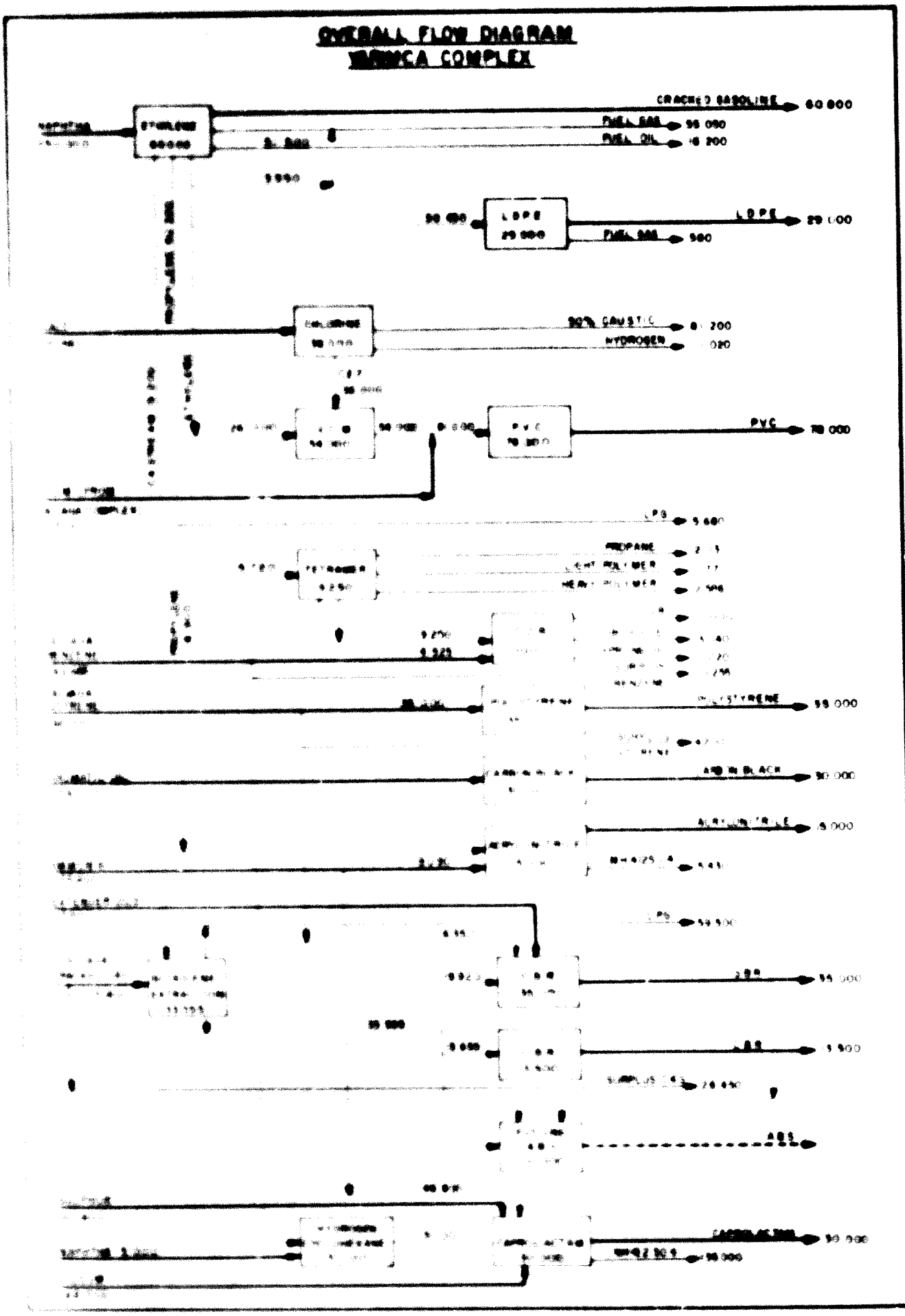
Year	PVC	HD PE	LD PE	PP	PA	TPA	DMT	E.O. Total	EoG
1969	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]
1970	31,450	[illegible]	[illegible]	[illegible]	-	-	-	-	-
1971	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-
1972	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]	[illegible]
1973	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
1974	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
1975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1976	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1977	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1978	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1980	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

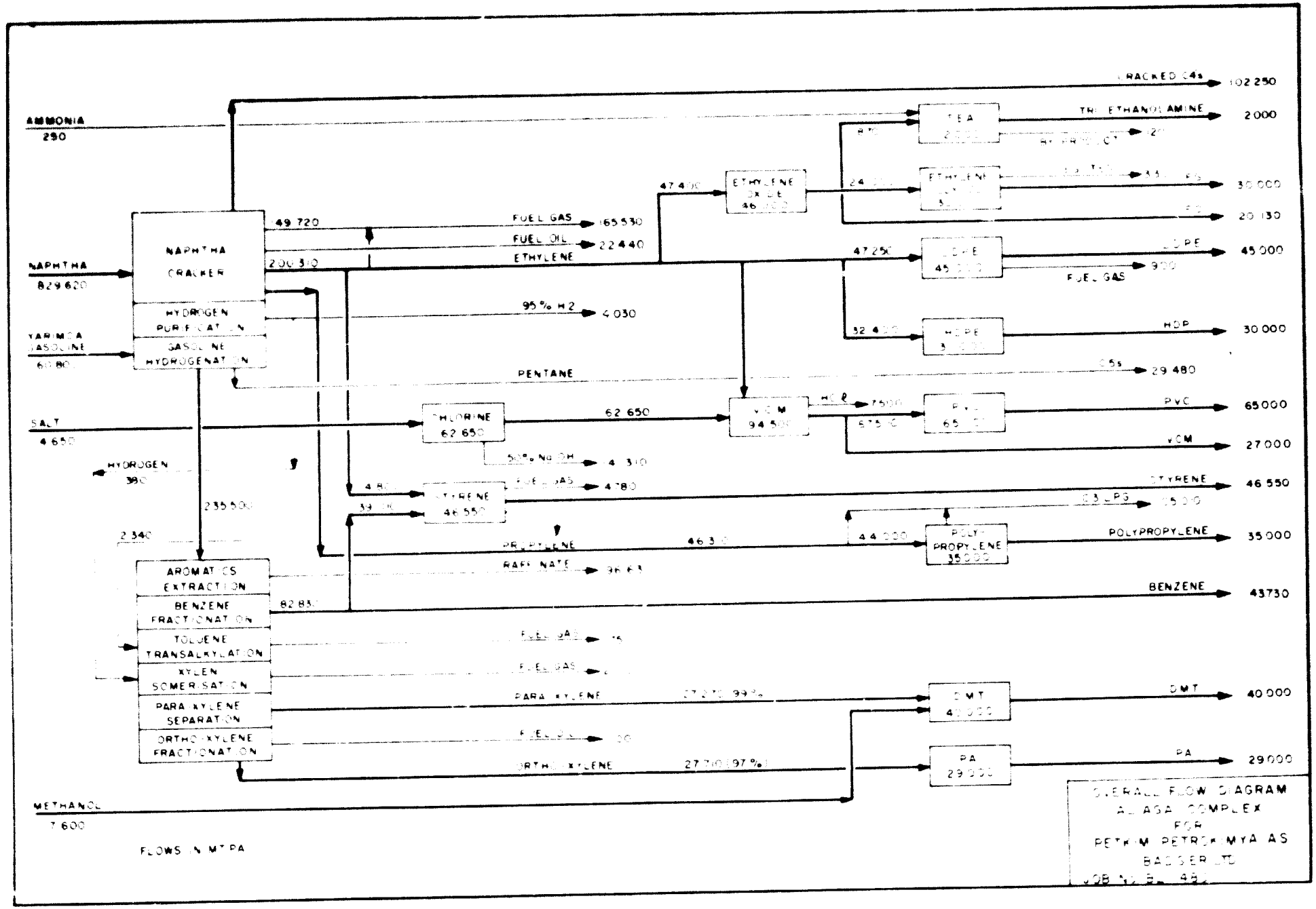
Table III/2

PROJECTED PETROCHEMICAL DEMAND IN TURKEY (expressed as metric tons)

Year	A H	D D S	P S	Polyethylene	S B R	C S R	Carbon Black
1969	-	7,481	[illegible]	13,100	-	-	-
1970	4,500	[illegible]	[illegible]	14,540	-	-	14,300
1971	5,750	12,660	10,000	16,140	-	-	15,600
1972	7,300	15,743	11,000	17,920	-	-	16,900
1973	[illegible]	17,140	12,750	19,890	25,000	7,500	18,300
1974	11,900	19,001	14,550	22,070	27,500	8,500	20,000
1975	13,200	24,116	15,000	24,500	30,000	9,500	22,850
1976	14,650	-	-	27,200	33,000	10,500	26,000
1977	16,300	-	-	30,200	35,000	11,500	30,000
1978	18,100	-	-	33,510	38,000	12,500	34,000
1979	20,100	-	-	37,200	40,500	13,500	-
1980	22,300	-	-	41,290	43,000	14,500	-

OVERALL FLOW DIAGRAM
VERONICA COMPLEX





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