昭和57年度中近東アフリカ計画に基づく石油化学工業(準高)集団研修コース(No.86)

実施報告書

昭和58年3月

国際協力事業団
研修事業部

はじめに

石油化学工業研修コースは，日本政府の開発途上国に対する技術協力事業の一環として，石油化学工業協会をはじめとする石油化学工業関連企業各社の協力の下に，昭和５０年よりこれまで通算８回実施されて来ました。

研修参加者は，中近東・アフリカ中南米の主に産油国の石油化学工業分野に於いて実際に関連業務に従事する中堅・上級技術者，石油化学工業開発プロジェクト関係者，石油化学工業関連政策立案者，等であります。

これら中近東・アフリカ諸国に寄せられる技術協力に対する要望は強く，本コースもそれに応えるべく開設されているものですが，同時にこれらの国々との友好協力関係の強化にも，重要な役割を果たしてきたものと確信いたします。

今般本コースの実施概要報告にあたり，多大のご協力を賜りました関係各位に厚くお礼申し上げるとともに，今後ともご支援とご協力を賜りますようお願い申し上げます。

昭和５８年３月

国際協力事業団

研修事業部長　山村　寛

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1. 昭和５７年度実施状況報告

1) 研 修 期 間

昭和５８年１月２７日～昭和５８年３月１１日

2) 研修日程概要

実　施　概　要	日　数
1. ＪＩＣＡブリーフィング	0.5
2. ＪＩＣＡ一般オリエンテーション	4.5
3. 専門講義	12.5
4. 関連工場見学（東京周辺）	4.0
5. 関連工場見学（中部・関西地方）	3.0
6. 顔合せ懇談会・技術討論会	1.0
7. カントリーレポート	0.5
8. 評価会・閉講式	0.5
計	26.5

研修員は新宿のホテルに宿泊する一方，当事業団実施の来日時ブリーフイング及び一般オリエンテーション（日本の文化・社会，経済一般）を受けた後，別添の研修日程に沿って「東京インターナショナル・センター（ＴＩＣ）」において専門講義に参加した。その間，石油化学工業関連施設を見学した。研修期間中の不明点等の解消を目的として中間期に，講師陣と全研修員との質疑応答を行った。又，研修評価会には講師陣も加わった。

研修を終了するにあたり３月９日（水）ＴＩＣにて閉講式を行ない，当事業団関係者はじめ通産省，石油化学工業協会の関係各位並びに講師の方々の出席の下に，研修員全員に修了証書を授与した。

3) 研修員応募概要

(1) 参加研修員（９名）の国籍，年令，現職等

別添資料の通り。

(2) 別表の通り，定員１２名，割当１８カ国１５名に対して１１名の応募者があったが，その内，イラクは要請を取下げ，一方モロッコは２名の応募者を要請越したが，１名は専門分野に難点があり，不合格とした。

(3) 過去７回の受入実績

年度	５０		５１		５２		５３	
定員	１２		１２		１２		１２	
期間	11.6～12.20		11.4～12.18		3.16 ～ 4.29		3. 1～ 4.14	
割当国＼実績／割当	割当	実績	割当	実績	割当	実績	割当	実績
アルジェリア	0	0	1	0	1	1	1	1
エジプト	2	1	2	1	1	2	1	1
イラン	0	0	2	3	2	2	2	0
イラク	3	1	2	0	2	2	2	2
クウェート	2	2	2	1	2	1	2	1
リビア	3	2	2	0	2	1	2	1
オマン	0	0	1	0	1	0	1	0
カタール	0	0	1	0	1	0	1	0
サウジアラビア	3	0	2	1	2	2	2	0
スーダン	0	0	0	0	1	1	1	1
トルコ	0	0	0	0	1	1	1	0
アラブ首長国連邦	1	0	1	0	1	0	1	1
計	１４	6	１６	6	１７	１３	１７	8

年度	54		55		56		57	
定員	12		12		12		12	
期間	2.28～4.12		2.26～4.10		1.28～3.12		1.27～3.11	
割当国 ＼ 割当／実績	割当	実績	割当	実績	割当	実績	割当	実績
アルジェリア	1	1	1	1	1	1	1	1
バハレーン	1	0	0	0	1	0	0	0
エジプト	0	0	1	0	1	1	1	0
イラン	2	1	2	0	0	0	0	0
イラク	2	0	2	0	2	1	1	0
ジョルダン	0	0	1	1	1	1	1	1
クウェート	2	0	1	1	1	1	1	1
リビア	1	0	2	0	1	0	1	1
レバノン	0	0	1	1	1	1	1	0
モロッコ	0	0	1	1	1	1	1	1
オマン	0	0	1	0	1	0	1	0
カタール	2	1	1	0	1	1	1	1
サウジアラビア	2	0	2	1	2	2	1	1
スーダン	1	1	1	1	1	1	1	1
シリア	0	0	1	1	1	0	1	0
アラブ首長国連邦	2	1	1	0	1	0	1	0
トルコ	1	1	1	0	0	0	0	0
ヴェネズエラ	0	0	0	1	0	0	1	1
計	17	6	20	9	17	11	15	9

4） 研修実施協力機関

(1) 政府機関および関連団体

通商産業省　通商政策局技術協力課

〃　基礎産業局基礎化学品課

（財）　造水促進センター

(2) 民間団体

石油化学工業協会

(3) 民間協力企業

日揮㈱，三井東圧化学㈱，三菱油化㈱，東レ㈱，三井石油化学工業㈱，住友化学工業㈱，旭化成工業㈱，日本合成ゴム㈱，日本石油化学㈱，三菱化成工業㈱，日本触媒化学工業㈱，積水化学工業㈱，積水化成品工業㈱，トヨタ自動車工業㈱，ブリジストン・タイヤ㈱，千代田化工建設㈱，ライオン㈱，旭硝子㈱，石川島播磨重工業㈱，宇部興産㈱

5) 添 付 資 料

(1) 研修日程表

月 日	曜	午 前		午 後	
1／27	木	来日			
28	金	ブリーフィング			
29	土				
30	日				
31	月	オリエンテーション		〃	
2／ 1	火	〃		〃	
2	水	〃		〃	
3	木	〃		〃	
4	金	〃		顔合せ懇親会	全 講 師
5	土	科学技術館	見学		
6	日				
7	月	総 論	平川芳春	総 論	平川芳春
8	火	日本の石油化学	灰谷佳朗	カントリーレポート	市東正利
9	水	設立基盤（流通，インフラ）	大内孝夫	設立基盤（政府・教育関係）	武藤伸次郎
10	木	日揮（横浜）	工場見学	造水促進センター（茅ケ崎）	見学
11	金	祭日			
12	土				
13	日				
14	月	オレフィン・BTX	跡部卿彦	LDPE	大橋俊英
15	火	HDPE	片岡卿彦	PP	木口智司

月　日	曜	午　　前	午　　後
2／16	水	三井石油化学工業　千葉工場　見学	午前に同じ
17	木	アンモニア　吉村哲郎	メタノール　江口知己
18	金	SM・PS　登原明史	塩ビ（ポリマー，モノマー）　上尾敬三
19	土		
20	日		
21	月	ブダジエン・合成ゴム　寺西　不	洗　剤　奥村　統
22	火	電解　斉藤　修	ED・EG　平井満夫
23	水	ブリジストンタイヤ	東京工場　見学
24	木	メインテナンス　高岩和雄	環境問題　上尾敬三
25	金	保安　川副正人	技術懇談会
26	土		
27	日		
18	月	TPA・DMT・合成繊維　土屋泰昭	東レ三島工場　見学
3／　2	～3/5	関西方面研修旅行	土屋泰昭
6	日		
7	月	計画と立案　鈴木竜之	建設と管理　芝尾紘一
8	火	世界の石油化学　日下芳春	日本の役割　高橋克行
9	水	千代田化工建設　見学	エヴァリュエーション・ミーティング　17:30閉講式
10	木	帰国準備	
11	金	最終帰国日	

LIST OF PARTICIPANTS

JICA GROUP TRAINING COURSE

IN

[redacted]	[redacted]	[redacted]
Director Economic Development Dept. Off. Royal Commision for Jubail and Yanbu P.O. Box 121 Jubail Industrial City Saudi Arabia Res. P.O. Box 346 Dhahran Air-Port Saudi Arabia	Head of Industrial Group Off. National Energy Administration P.O. Box 2649, Khartoum, Sudan Res. P.O. Box 52 Wad Medani Sudan	Process Engineering Supervisor Off. Petroquimica De Benezuela CarreteroMoron Coro. Moron Edo Carabobo, Venezuela Res. Carrera 1Z N°57A-14 Barquisimeto Edo Lara Venezuela

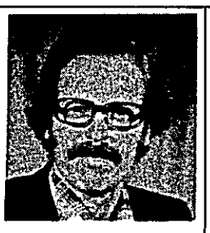
LIST OF PARTICIPANTS

JICA GROUP TRAINING COURSE

IN

PETROCHEMICAL INDUSTRY FOR AFRICA & MIDDLE EAST COUNTRIES FY 1982

ALGERIA



Mr. Mohamed
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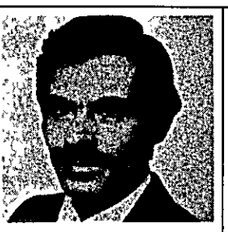
Res. Perret Bte No. 41
Oran-Algerie, Algeria

JORDAN



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Maintenance Manager

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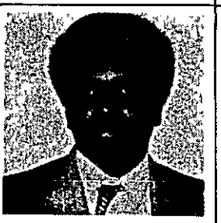
Off. Royal Commision for Jubail and Yanbu P.O. Box 121
Jubail Industrial City
Saudi Arabia

Res. P.O. Box 346 Dhahran Air-Port Saudi Arabia

SUDAN



Mr. Ismail
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Head of Industrial Group

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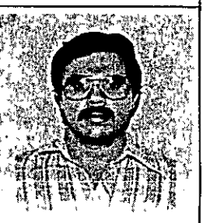
Res. P.O. Box 52 Wad Medani
Sudan

VENEZUELA



Mr. Nelson R.
DELLA ROCCA

Process Engineering Supervisor

Off. Petroquimica De Benezuela
CarreteroMoron Coro.
Moron Edo Carabobo,
Venezuela

Res. Carrera 1Z N°57A-14
Barquisimeto Edo Lara
Venezuela

(3) 講師氏名リスト

（ 敬称略 ）

	氏　名	会　社　名	依　頼　先	電　話　番　号
1	平川芳春	日揮㈱	本人	月水金(542)8561 火(588)7695 金(279)5441
2	灰谷佳朗	三菱化成㈱	有機事業部長　皆川進	(283)6689
3	大内孝夫	三井東圧化学㈱	人事部長　志水修	(581)6111
4	武藤伸次郎	〃	〃	〃
5	江口知己	〃	〃	〃
6	芝尾紘一	三井石油化学工業㈱	人事部長　若松司	(580)3611
7	川副正人	〃	〃	〃
8	片岡俊樹	〃	〃	〃
9	高橋克行	〃	〃	〃
10	跡部輝彦	旭化成工業㈱	本人	(507)2100
11	大橋俊英	三菱油化㈱	〃	0593(46)1111
12	鈴木竜之	〃	〃	(283)5562
13	斉藤修	旭硝子㈱	〃	(218)5419
14	木口敬三	住友化学工業㈱	工務部長　川崎昭三	(278)7120

	氏　名	会　社　名	依　頼　先	電　話　番　号
15	上　尾　敬　三	住友化学工業㈱	技術部長　石渡林太郎	(278)7120
16	登　原　明　史	旭化成工業㈱	合成樹脂第二事業部技術部長 大坂一敏	044(271)2586
17	寺　西　丞	日本合成ゴム㈱	取締役　市川龍夫	(541)4111
18	平　井　満　夫	日本触媒化学工業㈱	本　人	(502)1651
19	奥　村　統	ライオン㈱	〃	(613)6081
20	高　岩　和　雄	千代田化工建設㈱	〃	(456)1211
21	土　屋　泰　昭	東レ㈱	取締役　横内滞	(245)5600
22	日　下　芳　春	日本石油化学㈱	常務取締役　馬替泰	(501)7311
23	吉　村　哲　郎	宇部興産㈱	プラント事業部長　清水保夫	(585)6921

OBSERVATION & STUDY TOUR ITINERARY

February 28 to March 5 1983

NOTE : THIS SCHEDULE IS SUBJECT TO CHANGE

DATE & TIME		ACTIVITY	MODE OF TRANSPORTATION	ACCOMODATION/REMARKS
Feb. 28 Mon	0700	Assembly at Shinjuku Sta., South Exit Tokyo -- Mishima	Shinkansen Bullet Train Lv. Tokyo 0743 Arr Mishima 0847	
	0900 - 1200	Lecture: TPA DMT Synthetic Fibers Mishima Plant, Toray Industries Inc.		
	1300 - 1600	Tour of Mishima Plant	Shinkansen Lv. Mishima 1623 Arr 1806	Dai-Ichi Washington Hotel, Nagoya City
Mar. 1 Tue	1200	NOTE: TAKE LUNCH PRIOR TO DEPARTURE Lv. Hotel	Chartered Bus	
	1330 - 1630	Tour of Toyota Motor Co., Ltd.		Ditto
2 Wed.	0830	Lv. Hotel -Nagoya Station	Rail	To be escorted by Mr. Seto. Time to be confirmed
	0930 - 1200	Tour of Chita Plant, Ishikawajima-Harima Heavy Industries Co.,		Time to be confirmed
		Movement to Yokkaichi	Kintetsu Line (Private Line)	Hotel Sun Route Yokkaichi
3 Thu	0900	Lv. Hotel Pick-up by Mr. Teranishi	Company bus (To be confirmed)	
	0930 - 1200	Tour Yokkaichi Plant, Japan Synthetic Rubber Co.		Leave baggage in hotel cloak room
	1359 (1459)	Movement to Nara	Kintetsu Line Arr 1630 -- 1700	Hotel Hanakomichi, Nara City
4 Fri	0900	lv. Hotel	Chartered Bus	
	0930 - 1200	Tour Tenri Plant, Sekisui Plastics Co.		
	1330 - 1600	Tour Nara Plant, Sekisui Chemicals Co.		
	1700 or 1800	Movement to Kyoto	Kintetsu Line Approx. 35 min.	Kyoto Dai-Ni Tower Hotel
5 Sat	PM	Movement back to Tokyo	Shinkansen	

NOTE : 1. Notify Sun Route Hotel fron desk of 'Trip Out' and follow their instructions.
2. The tour area still maybe cold at this time of the year -- carrying of suitable warm clother -- sweater etc. - and also rain wear is advisable.

(5) 講師派遣先企業リスト

会社名	電話	〒	住所
日揮	279-5441	100	千代田区大手町２－２－１　新大手町ビル
三井東圧化学	581-6111	100	千代田区霞ガ関３－２－５　霞ガ関ビル
三井石油化学	580-3611	1100	同上
三菱油化	283-5511	100	千代田区丸の内２－５－２　三菱ビル
三菱化成工業	283-6111	100	同上
住友化学工業	278-7000	103	中央区日本橋２－７－９　住友日本橋ビル
旭化成工業	507-2730	100	千代田区有楽町１－１－２　日比谷三井ビル
日本石油化学	502-1561	100	千代田区内幸町１－３－１　幸ビル
東レ	245-5600	103	中央区日本橋室町２－２
日本合成ゴム	541-4111	104	中央区築地２－11－24
旭ダウ	507-2730	100	千代田区有楽町１－１－２　日比谷三井ビル
日本触媒化学工業	502-1651	100	千代田区内幸町１－２－２　大阪ビル１号館
千代田化工建設	456-1211	108	港区三田１－４－28　三田国際ビル
ライオン	613-6081	132	江戸川区平井３－13－12
旭硝子	218-5419	100	千代田区丸の内２－１－２　千代田ビル
宇部興産	585-6921	100	千代田区霞ガ関３－７－２

(6) 見学先リスト

見　学　先	依　頼　先
1　海水淡水化茅ケ崎臨海研究所	（財）造水促進センター 〒167 港区赤坂2－3－4 ランディック赤坂ビル 理事長　外島健吉 総務課　中村俊治 Tel 583-9431
2　日本合成ゴム　四日市工場	〒104 中央区築地2－11－24 総合企画室　吉田主査 Tel 541-4121
3　ブリヂストン・タイヤ　東京工場	本社 〒104 中央区京橋1－10－1 社長　服部邦雄
4　東レ　三島工場	本社 〒103 中央区日本橋室町2－2 取締役　横内滞
5　トヨタ自動車工業　豊田工場	本社 〒471 愛知県豊田市豊田町1 第三公報課長　佐々木康夫 Tel 0565-28-2121
6　積水化成品工業　天理工場	東京事務所 〒106 新宿区西新宿2－1－1 新宿三井ビル 取締役　長谷川整司

見　　学　　先	依　　頼　　先
7　積水化学　奈良工場	東京本社 〒 105 港区虎ノ門3－4－7 森ビル36 福　田　総務課長 Tel 434-9023
8　三井石油化学工業千葉工場	本　社 〒100 千代田区霞ガ関3－2－5 霞ガ関ビル 海外企画部　吉宗部長代理 Tel 580-3611
9　日　揮　横浜事業所	本　社 〒100 千代田区大手町2－2－1 新大手町ビル 取締役　加　藤　房之助
10　石川島播磨重工　愛知工場	本　社 〒100 千代田区大手町2－2－1 新大手町ビル 輸出統轄部中 瀬　戸　様

(7) カントリーレポート

COUNTRY REPORT

/ ALGERIA

I PRESENT SITUATION OF PETROCHINICAL INDUSTRIES

In Algeria, the petrochimical field is divided between the three following companies: (see appendix I)

SNIC (chimical Industry National Company): Synthetic detergents Paints, Lacquers and additives

ECPC (Plastics and Rubber National Company): This company is interested particularly by the transformation of the synthetic products Auch as PP, PVC, LDPE, HOPE etc.

SONATRACH (Hywocarbous hamport and Commerciahzation National Company): Plastics (C' -PP-PVC-VCM-etc.)-Fertilisers- and others products such as urea, Hethanol, Caustic Soda etc.

I shall talk about the last mentionned company (SONATRACH) because I have not any data about snic and ENPC.

Than, the production plants of SONATRACH are situated at the east and west of the country.

In the west of the country there are two plants concentrated in ARZEW:

The first one produces : Methanol

Formaldehyd

Thermosetting resins
- Moulding Powder Resins (Phend-formaldehyd)
- Monlding Powder Resins (Urea-formaldehyd)
- Liquide Resim (Urea-Melamin formaldehyd)

The second one produces : Amonia

Urea

Fertilisers

Nitrat acid

In the east of the country there are also two plants. The first one situated at SKIKDA produces:

Ethylene

VCM

PVC

LOPE

HOPE

Canstic Soda

Hydrochlovic acid

The second on situated at ANNABA produces:

Fertilisers

II PARTICULAR PROBLENS OF PETROCHIMICAL IND. IN THE SONATRACH

The petrochimical sector in SONATRACH has not any problem with the main raw material which is GAS becouse this is a natural resource but it faces problems with the others raw materials such such as Phenol, nelamin, celluloise etc. the 90% of the mecanical spare parts are inported.

The operators of maintenance and production departments are not adapted at the advanced technological process of petrochimical industries. The commericalization difficulties are very important: the imperfect knowlege of the local market consumption, the insufficiency of the hansport and distribution means, the unbalancing between the petrochimical development and the hausformation insdustry development (ENPC), are very big problems witch limit the performance plants.

III FUTURE PROSPECT OF PETROCHINICAL IND.

At present the government overrations are to reduce those necks beginning: a- rorevise the big companies structure (for example sonatruen, the light company in the country is composed by 100,000 workers!)

b- to renovate the existant plants and than to increase their rate

c- to increase the capability of the operational personal this at a first time.

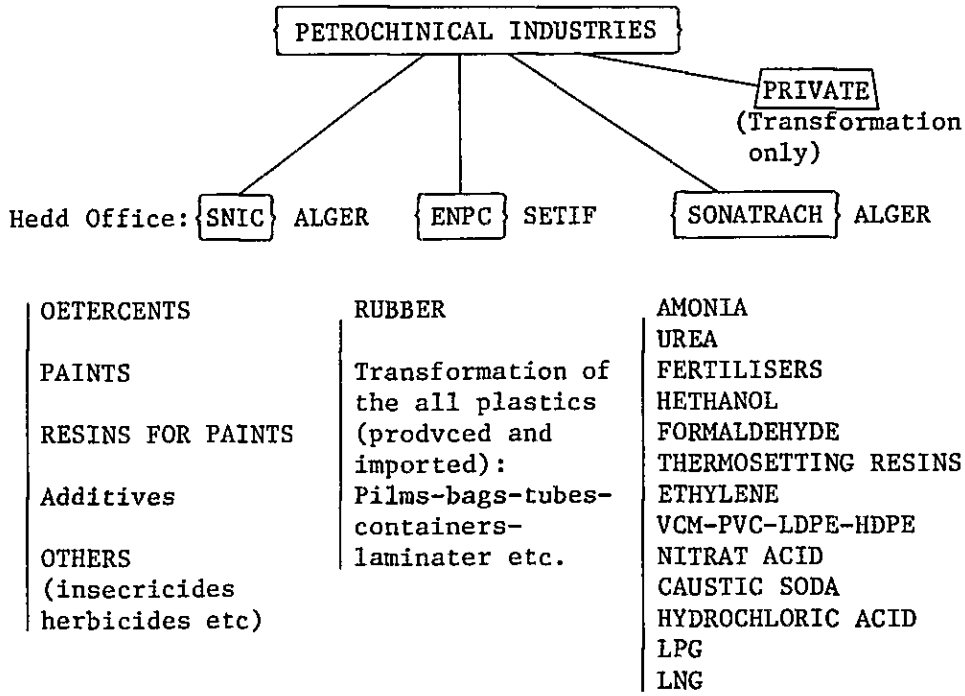
Than, it is necessary to develop the technical cooperation with developped countries; it seems the main way for to increase the know how (particularly in maintenance and production departments), at short tern cerrainly!

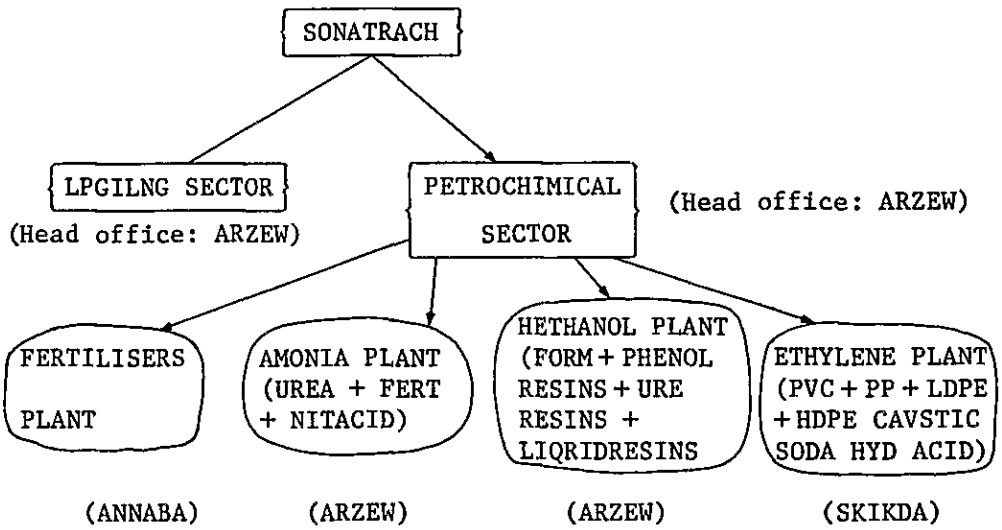
It is also necessary to inprove the distribution circuits of those particulan products (PVC, Resins, various acid etc.) and to develop the upsteam and the dowstream of the petro, chin, ind. creating new products and additives plants, also new plastics transformation plants.

IV. ORGANIZATION OF THE PETROCHINICAL SECTOR IN SONATRACH

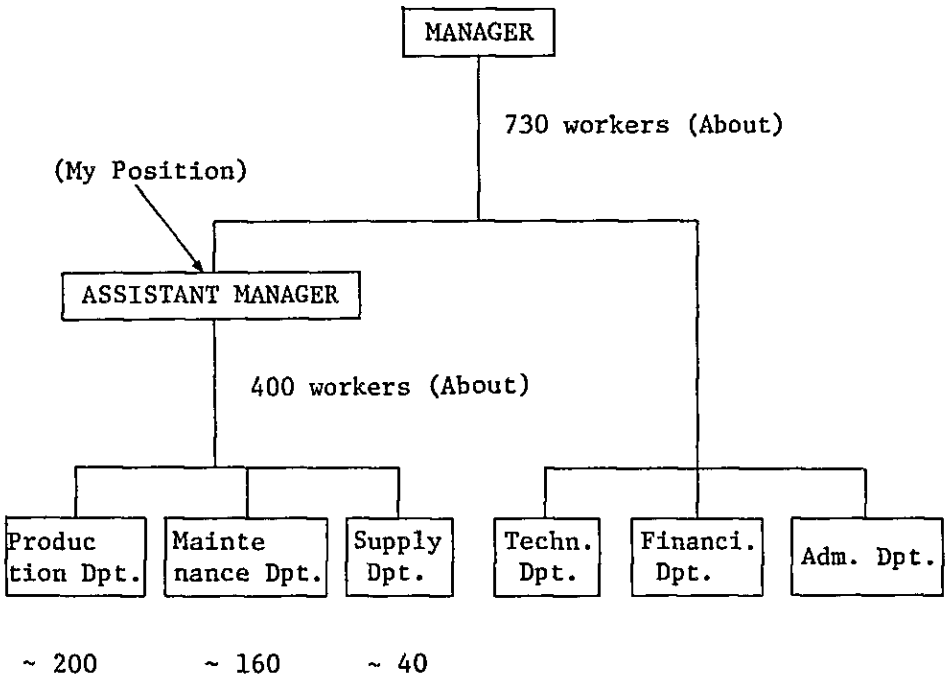
In 1983, the petro. chin. sector of SH. will become an independant company with her own commercial structure. This new company will be composed by the mentionned plants on the chapter I. At present, Inyklg Iwork in the methanol plant /ARZEW Aince 1975. Hypresent forition is assistount manager. (see Appendix II) I think that the revision of the structure is an advanrage for my sector. Becoming an independant company, this sector will adopte quick meaus and an agrenive political for to increase the rate of the all plants. It will be easy to decide gruickly abotu problems.

Appendix I


PETROCHINICAL INDUSTRIES
PRIVATE
(Transformation only)
Hedd Office:
SNIC ALGER
ENPC SETIF
SONATRACH ALGER
OETERCENTS
PAINTS
RESINS FOR PAINTS
Additives
OTHERS (insecricides herbicides etc)
RUBBER
Transformation of the all plastics (prodvced and imported): Pilms-bags-tubes-containers-laminater etc.
AMONIA
UREA
FERTILISERS
HETHANOL
FORMALDEHYDE
THERMOSETTING RESINS
ETHYLENE
VCM-PVC-LDPE-HDPE
NITRAT ACID
CAUSTIC SODA
HYDROCHLORIC ACID
LPG
LNG


SONATRACH
LPGILNG SECTOR
(Head office: ARZEW)
PETROCHIMICAL SECTOR
(Head office: ARZEW)
FERTILISERS PLANT
AMONIA PLANT (UREA + FERT + NITACID)
HETHANOL PLANT (FORM + PHENOL RESINS + URE RESINS + LIQRIDRESINS
ETHYLENE PLANT (PVC + PP + LDPE + HDPE CAVSTIC SODA HYD ACID)
(ANNABA)
(ARZEW)
(ARZEW)
(SKIKDA)

ORGAN. SHART OF METHANOL PLANT



THE COUNTRY REPORT OF JORDAN

Eng. Sami M. Said

Jordan is situated off the south - eastern shores of the Mediterranean Sea between latitudes 29° and 33° north and longitudes 34° and 39° east, and extends eastwards into the Arabian Desert. It is bounded by Syria to the north, occupied palestine to the West, Saudi Arabia to the south and Iraq to the east. Jordan's outlet to the sea is a 40 Kilometer stretch of land on the Red Sea at Aqaba.

The total area of Jordan (East and West Banks) is 96,]88 sq. km. Of this area the East Bank is 88,800 sq. km. While the West Bank is 6,633 sq. km. The Dead Sea area is 755 sq. km.

Total population of the East Bank of Jordan is estimated at at 2.4 million. It is characterized by a relatively high growth rate of 3.8% per annum and an increasing tendency to settle in towns. About 1.3 million in habitants, or 50.4% of the total population of 2.4 million live in the three major towns of mman (870,000) people, Zarka (285,000) and Irbid (145,000). The labor force of the East Bank of Jordan is estimated at 497,000 persons or 20.7% of total population of this fiqure 34,800 persons (or 7%) are engaged in agriculture, 45,700 persons (or 9.2%) in mining and Industry and 416,500 persons (or 83.8%) in services.

Mineral Resources :

The country's mineral wealth lies predominantly in its phosphate reserves which cover 60% of Jordanian territory and are estimated at 3,000 million tons. Quantities of Uranium and Vanadium are now known to be mixed with the phosphate reserves. The existance of about 55 million tons of good quality copper

are was announced in 1974. Other minerals include gypsum, managanese ore, abundant quantities of glass sand, tripoli, marble, granite, garnet and the clays and feldspar are required for ceramics manufacture. The Dead Sea probably has the biggest reserves of pottassium, sodium and bromine in the world. Prospective reserves of oilshale in Jordan are estimated to be as high as to billion tons - placing it amongst the world's leading oil shale reserves.

Due to the nature of its natural resources, the Kingdom enjoys comparative advantages in the field of mineral resources and their possible exploitation at comparatively reasonable costs.

Petroleum Refinery

The refining capacity of Jordan petroleum refinery 12500 tons per day and it's products as the following :-

- Liquid Gas 65,000 tons.
- Gasoline 32,000 tons.
- Aftor 264517 tons.
- Kerosine 166774 tons.
- Diesel oil 658279 tons.
- Fuel oil 597529 tons.
- Asfalt 138731 tons.
- Automotive motor oils.
- Engine oils for commercial road.
- Diesel engine oils.
- Gear lubricants.
- Hydrulic oils.
- Compressor oils.

To enlarge Jordan's existing refining capacity of about 4 million tons a year, with the begining of the 1990s, Jordan

petroleum refinery company is considering to establish a refinery with a capacity of about 9 million tons a year in Aqaba. The capacity of the first phase will be about 3 million tons a year.

The Plastics and Paints Industry

Although some companies are performing well, the activity through is much lower than must be. In 1982, throughput, totalled only about 90,000 tonnes of all materiels.

Plant is on average operating for only half the available hours each week. We estimate that the utilisation of availabe capacity totals only about 60 percent. Processes operating included extrusion, blow - moulding injection moulding, vaccum forming compounding, weaving steam moulding of E.P.S, and polyurethane foam. The most successful elements are those p providing footwear, and polyurethan foam products.

There is no production of plastics intermediates, but one company is supplying PV processors with compounded materials. The industry is very fragmented, with little opportunity for inter - company communications, and no dialogue as awhole with Government.

The plastic and paints industry is without doubt one of the most active industrial sub - sectors in Jordan. The 1982 inports of artificial resins and plastic materials amounted to 6000 mt. It follows that there is little need to encourage this Industry which is progressive and export - conscious. Nevertheless, there are causes for disquiet.

A brief observation of but some six companies shows that they are concerned with polyvinyl acetate, polystyrene, polyethylene, polyvinyl - chloride, polyeurathane, and polypropylene. Is there acase for :

- The import of vinyl chloride monomer granules for conversion to polyvinyl chloride, and
- the import of styrene monomer, for conversion to polystyrene.
- Polyvinyl chloride and polystrene are currently being used in Jordan by a number of factories and, whilst it has been difficult to ascertain the tonnages involved, the apparent rate of growth is such that by the time the "conversion" plants could be built - say, 2 years - the need would be adequate to support them.

The high cost of raw materials for the plastics and paint industry is unlikely to be reduced until, as and when, a petrochemical complex is established at Aqaba in Jordan; however and meanwhile, increased "Local conversion" would reduce the cost of imports.

The Fertilizer Industry : -

The Jordan Chemical Fertilizers Industry Company was established to process Jordan's phosphate reserves into fertilizers for export.

The production started in the middle of the 1982. It is expected to produce in a first stage of full production in 1985, 740,000 tons of di - ammonium phosphate and 105,000 tons of phoacid, per annum. Fuel oil and phosphate rock will be supplied by domestic production.

The Jordan chemical fertilizers industry Company has been investiguting the possibility of exploitation as the deposits of radioactive minerals relate to the deposits of phosphate beds. According to estimates it my be possible to produce something like 80 - 100 metric tons of "Yellow Cake" (U_3O_8) per year based on a phosphate feed of 1,3 million tons ayear from

the moderate radio - active zones. Other deposits with radium are found with the hot spring deposits.

MINISTRY OF OIL

P.O. Box 22795 KUWAIT.

PETROCHEMICAL INDUSTRIES COMANY (K.S.C)

Petrochemical Industries Company (PIC) was founded on 18th July, 1963 with the object of utilizing the country's natural resources by setting up various types of Petrochemical Industries in Kuwait. The Company is wholly owned by the State of Kuwait and is administered as a component of the Kuwait Petroleum Corporation.

PIC has passed through various phases of expansion and merger until it has become one of the largest companies in the world manufacturing chemical fertilizers.

FERTILIZER DIVISION

The Fertilizer Division is located at Shuaiba Industrial Area and includes :

Plants	T. Annual Capacity
Three Ammonia	660,000 MTs
Three Urea	792,000 MTs
One Ammonium Sulphate	165,000 MTs
One Sulphuric Acid	132,000 MTs

In 1979 the Company signed the manufacturing licence and engineering agreements of a fourth ammonia line to produce 1000 MTs per day by the second half of 1983, consequently the total production of our four ammonia plants will be about One Million metric tons per year.

SALT & CHLORINE DIVISION

This division is located at Shuwaikh and comprises :

Plants	T. Annual Capacity
Two Salt	18,600 MTs
One Chlorine & Caustic Soda	9,800 MTs 11,050 MTs
One Hydrochloric Acid	329,000 Gallons
One Sodium Hypochlorite (Chlorsal)	15,000 M^3

EXPORT

PIC products are exported to more than 50 countries all over the world. Shipping operations are organized to utilize the most modern methods. India, China, Ethiopia, Tanzania, Sudan, Somalia are countries among those who import our fertilizer products.

SAFETY

The Company gives special care and attention to the safety of employees and plant by carrying out special safety studies covering all company operations and several safety courses have been conducted to raise the safety consciousness of company employees. In addition, many employees have been given a special training on accident prevention and fire fighting.

MOHAMED JA'AFER AL-SHAWAF

SOCIALEST PEOPLE LIBYAN ARAB JAMAHERIEA

GENERAL COMPANY FOR CHEMICAL INDUSTRIES ABU-KAMMASH

COUNTRY REPORT

The ubyan economy at the age before 1970, despite apparent abundance cast by oil, constitutes a good example of the economy of under developed countries characterized by dependence on one source of income, the oil, with all the economic risks of dependence on one source which is a natural one, subject to depletion or change in value because of development, as we are living in the age characterized with rapid development and what is currently used may loose its value because of development.th

On studying the development of the national economic structure from 1962-1969 the oil sector had a high percentage of contribution in national economy. As the oil revenues doubled 12 times during this period, i.e from 160,710 million dollars 48.7 million dinars in 1962 to 204,270 million dollars, 619 million dinars in 1969, while the revenues of industrial activities realizeo an increase from 10 million dinars to 19.3 million dinars during the said period. So the industrial sector's contribution in gross income dropped from 5.6% in 1962 to 1.7% in 1969 against an increase of contribution by the oil sector from 26.4% to 65.7% during the same period, this led to lessing the role played by industry.

In order to change this situation, it was imperative to adopt a long term strategy aimed at rectifying the structure of national economy by the increase of the industrial sector's contribution in the national income through proper expilotation of natural and material resources available in the country and facing the fundamental requirements of the people such as food, clothing and housing by realizing and housing by realizing

self-sufficiency in such commodities, through local industrialization, as a preliminary stage, then by entring the stage of basic heavy industries according to ultramodren scientific and technological means. So if we look through the last ten years 1970-1980 we will found the expenditures on the industry sector increased from 67,650 million dollars on 1970 to 730,950 million dollars on 1978 including with that the petrochemical industries based on petroleum and mineral sources available in the country which can provide welfare and prosperity to the ubyan arab masses and conseguently liberate the national economy from dependence and influence so we can summarize the petrochemical industries buil up in the lost ten years as following:-

1- Big petroluem refinery company located at zavia to produce the requirement of the country from fuel oil, kerosine benzene and gasoline.

2- Amonia, urea and methanol plant with capacity 330,000 ton/year methanol at brega.

3- In the next two years we will have a big petrochemical complex at raslanof to produce about 330,000 T/Y ethylene, 50,000 T/Y propylene, 60,000 T/Y butadiene with some mone products based on ethylene and propylene such as polyethylene, polypropylene and ethylene glycol.

4- Petrochemical complex at abu-kammash for a production of 60,000 MT/Y of poly vinyl ohloride.

- Also there is a possibility of build up a nother polyvinyl chconide comnide salts and ethylene from ras-lanof the project is under final investigation.

* All the above development and the planing of the future of the industrialization sector is superyised and supported by following organizations :-

1- Industrial research center its function to carry out industrial studies and researches, perform gelogical studies and explore the mineral wealth in the country.

2- General national organization for industralization: it is regard as the main structure for the execution of industrial projects.

3- Industrial real estate bank its function 15 to provide funds necessary for the industrial and real estate sectors.

The national industries are facing a number of impediments preventing the complete exploitation of their productive outputs, mainly because of minor local market, non-availability of rain material, lack of skilled manpower and competition of imported products.

The organization were I have been working is the general company for chemical industry (GCCI) based on a chemical complex which is one of the biggest petrochemical projects in the middle east and africa, the extent of the complex is higher than 500,000,000 dollars, its location in abukamash, 144 km west of tripoli No. of personnel : 1500.
It is a complex composed the following parts :-

1- Brine winning, pumping, and purification 110m^3/h.

2- Salt Plant:

Total Salt	120,000 MT/Y
Table Salt	40,000 MT/Y

3- Electrolysis plant:

Total Chlorine	47,740 MT/Y
Liq Chlorine	5,000 MT/Y

4- Caustic soda evaporation and filling 49,000 MT/Y

5- Sodium Hypochlonite (150 mg/L) 8,900 MT/Y

6- Hyonochlonic acid (30 %) 8,000 MT/Y

7- VCM - Vinyl chlonide monomer 62,500 MT/Y

8- PVC. Suspension poly vinyl chlonide 60,000 MT/Y

Including the main auxiliries such as : Sea water desalition plant, waste water treatment, steam generation, nitrogen plant, cooling water station, and etc.? In the final write the adress. To the back side of the paper the The adress of the company : POST POX {071/100 / 411/100} ZUARA

TELEX NO. 30437

TEL NO. 601704 AND 601711

1111 7

The main probelm facing our company is to sale our product such as PVC & Naoh due to limited local market consumer.
And the other problem is the shortage of skilled manpower.

COUNTRY REPORT

MOROCCO

I. Present situation of petrochemical Industrie

So far Moroccao don't produce crude oil, so at present we havn't many petrochemical firms. The only firm scisting now is the "Societe Nationale d'Electrolyse et de Petrochimie" - SNEP - (National Company of Electrolysis and Petrochemistry).

It is implanted near the port of Mohammedia and the Crude Oil refinery "SAMIR". The port of Mohammedia is specialized in importing crude oil.

SNEP was designed in order on the one hand to consume salt from a new salt-mine near Mohammedia and on the other to save curnency from buying PVC from abroad, for at that time the international price of PVC was too high.

SNEP begin working in 1978 after 3 years of construction by Krebs - a french ingeniering -

Besides SNEP thereisa new big plant in construction for Lubricants (100,000 tons per year). This plant is connected with SAMIR.

II. Presentation of the SNEP Compayny

SNEP is a national compayny under the government control It includes 3 main plants.

1- Electrolysis

Process = Kvebs

16 Mercury Cells - Permeles Anodes

Current density = 10 kA/m^2

Production = Chlorine : 25,000 tons per year (capability)

Production = Soda : 28,000 tons
Hypochlorite according to request

the salt braught from the mine feeds 2 saturators. Then brine is treated with carbonates, deccuted and filtered before feeding cells.

All CP2 produced is commessed at 7 ky/cm^2 into dry pistonning compressors Burkharelt 10,000 tons are liquified and 15,000 tons selt to VCM plant.

10,000 tons of soda are concentrated into solid soda in bertiams unit. There is also a mercury depollution unit.

2- VCM

Process = Staneffer Chemical USA

Production = 26,000 tons VCM per year (capability)

2-1- Direct - Chlorination and refinicy DCE

CP2 coniny from Electrolysis and C_2H_4 from storaye witch is unplanited out the Port (tank of storaye = 5000 m^3, pumps, compressors and lique factor) enter in reaction and we obtain crude DCE witch is refininy in columns.

2-2- Craking DCE and refining VCM

Dry DCE is craked into furness and we obtain VCM, HCl and residual DCE.

VCM is refined columns and sent to storages.

HCl is sent to Oxy-chlorination Section.

2-3- Oxychlorination

HCl, C_2H_4, and air from centrifuyal compressor enter in reactieu into 3 serial set reactors witch are filled up with a special catalysis we obtain DCE witch goesto be refined.

3- PVC

Process = Stceneffer Chemical USA

Production = 20,000 tons/year Suspension
(capability) 5,000 tons/year Emulsion

5 Reactors PCV Suspension

2 " " Emulsion

VCM is put into reactor with catalysist and others components. Reaction is controled by mean steam or cold water into the doble envelope, then product goes to centrifregation → rotating dryer → sifting → storage.

From Emulsion reactor product go to atomiser → dyer → sifting → gruider if needed.

There are also two others amall units:

1- PCV compound yrunilar

2- PCV compound dry blend (alimentery)

III. Particular Problems witch we are facing

1- Corrosion of flcuk and cover of Electrolysis cells

2- Refining of the brine

3- Chlorine Compenors

4- Corrosion in the tubs of the DCE craking furness

5- Corrosion in some seclumyers in the VCM plant

6- Corrosien of the Nickel lines in the Docyclilorination section

7- Commercial problems :

- High denand of soda and low demand of PVC
- High cost price of products for a small production capacity and High international price of Ethylen
- High cost of Spare parts imported from Europe.

IV. Future prospect of petrochemical industries

At Present we urteud in the first step to develope PVC tians formation such as PCV tub for diceiring. One unit of this type will start in few months.

Besides we untend to do actarsion of the Electrolysis unit, for soda is more requested.

Later we project the setansion of VCM and PCV plants.

Requeding to the local comsumption of polyethylen (about 25,000 tons/year) We are prospecting polyethylen plant of about 60,000 + 1 year Then also a plant of Naphta Steam-craking is projected to have erhylen avclilable for PVC and Polyethylen plants.

V. Snep Organization

Under the General Manaher we have :

1- Production Manager
2- Maintenance Manager
3- Administration Manager
4- Financial Manager
5- Selling Manager

Jam the maintenance manager J supervise 3 main depeurements:

1- Mecanical Maintenance
2- Electrical Maintenance
3- Electronic and control process

The production manager and J are responsible of the improvement of the installation. We work together for the secteasion and for the new projects.

J stauted at SNEP in 1975 of the beyining of the construction. Before J had been working in the National company of

Electricite cluring 5 years.

BENNANI Mohamed.

4th Feb. 1983.

STATEOFQATAR. QAPCO.

QATAR PETROCHEMICAL COMPENY LIMITED.

INTRODUCTION AND PROCEDURES:

PREPARED BY:

ENGINEER. SALEH. A. HIJI.

ASSISTANT, MAINTENANCE, MANAGER.

IN THE NAME OF GOD

OUTLINE OF THE COMPANY.

QAPCO WAS FOUNDED IN 1974.

Shareholders	Qatar General Corporation (QGPC) 84 %
Eqyity	QRS. 360 million.
Total Investment	QRS. 2600 million.
Pl and Location	UMM-SAID.
Feed stock	Ethane provided by NGL (Natural gas liquid plant).
Products	Ethylene 280,000 T/year Low density polyethylene 140,000 T/year. Solid sulphur 46,000 T/year.
Employers	650 employees.
Site area	100 hectare.
Main contractors	Ethylene plant technip (france) Low density polyethylene coppee rust (Belgium). Steam and power plant, turbotecnica (Italy) General offsite facilities, Japan Gazoline Corp (Japan)

THE STEAM CRACKING PLANT.

The steam cracking plant is fed with a gas called "ethane

rich gas" which is composed of approximately 60% ethane 20% methane and 20% acid gases.

The gas comes from the plants of OGPC.

NGL plants gather all associated gasas both from onshore and weell and after processing they deliver to QGPC upto 600,000 tones a year of ethane rich gases needed for producing 280,000 T/year of high purity ethylene (99-95%) steam cracking involved the pyrolysis of hydrocarbons in the presence of steam plessure and with the absence of catalysts.

The molecules of hydrocarbons are there by "cracked" to give smaller molecules which are more reactive and can easily be used for chemical eactions. The steam cracking plant comprises mainly of:

The gas treatment section.
The cracking section.
The separation section.
The gas treatement section.

The cracking concerns mainly ethane. Before sending it to the ethane rich gas must be treated for the following to obtain a gas with ethane high content (95%)

1. Removal of acid gases.
2. Removal of methane.

The removal of acid gases (H_2S and CO_2) is made through a washing unit using Deethanolamine (D.E.A.) for abdorption.

The "sweet gas" is then sent to the first Demetinizer for the removal of methane. Methan gos to the fuel gas system, the ethque highcontent gas is either directed to buffer storage (2 spheres each 4000 m^2) or forward directly to the cracking furneses the acid gases recovered from the washing unit are send to the sulphur recovery unit. Inside the unit H_2S is

transformed to sulphur by using the Claus Catalysitic process. Sulphur leaves the unit as liquid A prilling unit service the liquid sulphur and delivers solid sulphur plates which are sent as bulk to a 8000 T storage warehouse. The warehouse is equiped with an automatic reclamer devise linked to the loader placed on the wharf sulphur, will be loaded directly as bulk in to carrier ships berthed to the quay Expected solid sulphur production is 45,000 T per year.

The craking section.

7 furnesses have been erected for receiving the ethane high contain gas. One is kept as spare. 6 allow the full production of ethylene. Before entering the furness. Steam is added to the gas in order to facilitate the reaction and radis the depo sition of coke inside the cracking tubes. Tubes are heated up to 850 C. and gas plus steam progress vary quickly underless than halfsecond for the total transis. From the economical point of view, the gas is preheated by the exhaust smokes of the the furness and the very high temperature cracked gases are cooled by producincing high pressure steam.

The separation section.

3 sub section can be observed

1. The hot sub- section
2. The compression sub- section.
3. The cold separation sub- section.

1. The hot sub- section.

After passing through a first exchange used for steam production, cracked are cooled vary quickly in a quench tower. Temperature is brough down to 35 C in a very short time. Fast cooling is needed to avoid the reversibility of the cracking

operation. Before being directed to the compression sub- section, water and heavy pyrolysis oils are removed from the cracked gases.

2. The compression sub- section.

The higher pressure needed at the inlet of the cold separation is provided by a five stages centrifugal compressure. Pressure is built up to 36 bars. In between the fourth and fith compressor. Gracked gases go through a washing unit for the romoval of acid gases and heavy pyrolysis oil. When leaving the compressor, gases cross drying units for complete removal of water before being cooled down at vary low temperature.

3. The cold separation sub section.

Cracking of ethane is a vary complex reaction which in fact gives hidrogene and a vary large renge of hydro carbon products but of course with a priority to ethiline. Recovery of various compounds is made in serveral steps by fore frictionated distelation. To obtain the foregoing step, cracked gases must be cooled down vary deeply, down to minus 95 C. This can done by using successively two defferent fluids, first liquid is propylene, second liquid is ethylene. Progressively recovered are:

Hydrogenamo methane, recyceled as fuel gas. However part of hydrogen will be purified and used for hydro-genating C_2 and C_3 hydrocarbons.

C_2 cut comprising ethane, ethylene and acetylene.

Acetylene is converted into ethylene by hydrogenation, the final C_2 splitter tower separates ethylene from ethane. Ethane is reciceled to the cracking furnaces. Cery high purity ethylene (minimum 99, 95% 0 is to sent either to the storage (30,000 m^2

—104 C atm pressure) or to polyethylene plant.

Ethylene storage is connected to the loading arms located on the wharf.

Specialized ship tankers berthing to the wharf can be directly loaded or unloaded from or the storage tank.

-C_3 cut comprising mainly propane and propylene. A hydrogenation reactor is also used for improving propylene recovery. Propane is seperated from propylene and recycled. Propylene is is sent to storage (one 1000 m^2 sphere) and will be used partly to fill up the propylene cooling system and partly to feed the polyethylene plant as a transfer agent.

Expected propylene production is 5000 T/Year.

C_4 cut is sent back to the fuel gas system. The remaining heavier hydrocarbons are burnt in an incinerator.

THE POLYETHYLENE PLANT.

The polyethilene plant has been designed for production of T/Year of density polyethylene in a single line. It is the second plant in the word having such a unit capacity after COPENOR in France. A sister company owned by CDF chemy and QGPC,

The plant utilize CDF chemies process, the plant comprises of:

a) The compression section.

b) The polymerization section.

c) The homogenization and bagging section.

The compression section.

Ethylene, with minimum purity of 99, 95% received from the

ethylene plant is first compressed up to second compressure will then boost the pressure up to 1000 to 2000 bars. It must be noted that this compress or is driven by an elictrical motor of 17,000 K/W. High pressure ethylene is sent to the polymerization section.

The polymerization section.

High pressure ethylene including or excloding transfer agent, is introduced inside a stered autoclave reactor by the introduction of catalyst agent, the polymareazation reaction is ininitiated and controled by polymarezation reaction. It must be understood that ethylene molecules join together strongly linked to form a vary long moleculee chaino of polyethylene. Conversion from ethylene to polyethylene is partial, conversion factor can reach valiues up to 20% quolity of the polyethylne is stricktly dependant on pressure and temperature inside the reactor Accurate control of this two parametrics allow to produce the various qualities needed inside the reactor, ethylene and polye thylene are fully mixed for separating ethylene from polyethylene, the mixture is sent to a separetor through the automatic reactor diffusion valve. Pressure is dropped down to 250 bars, so most ethylene is recovered and sent back after cooling to the secondary comperessure section from botom of the separator, the polyethylene is forwarded to midium and low proessure hoppers were the ethylene contiues to be removed.

The last hopper is fitted upon an extruder. The extuder contributes to the homogenezation of the various additives. If needed such as: slip agent anti-oxcidant, anti- U.V or anti-blocking agent etc.....

And the end of the extruder, an under water pelletizing devise produces pellets. And removal of water, pellets are

sent to the homogenazation through automatic weighing unit, controling the output of the unit.

The Homogenezation and bagging section.

To insure the steadfasting of the qualities, polyethylene is homogenezied by batches silos by this way a complete uniformity of the properties can be obtained after homogeneazation, the product is sent either to the storage silos 250 T. each or to the bagging section. Storage silos have been designed to allow directbulk loding in tracks.

Bagging is made through to fully automatic line valve bags are used to receive 25 kg of polyethylene each. This kind of bag with square shape allow the building up of nice pallets easy to handle and to screre. Palleting is also fully automatic and the pallets are wraped by shrinkable film. thus handling is easy today to do, with no risk to pull down the pallets. Pallets are then storared in a wharehouse of 24000 m.

A large part of the polyethylene will be exported by ship. It is could be loded either directly in pallets or inside conteners. A mobile crane specially for containers handling is on site. A getty crane also equiped with container in side the ship. Some polyethyleme will be delivered by tracks for all regional sales.

MAIN USES OF LDPE.

The end uses of low density polyethylene cover many fields: The following are the main ones:

1) FILMS:

Heavy duty bags (plastic material fertilizer etc.....)

Multy- purpose bags (super Markets)

Shrinkable film (for pallets)

Agricultural film (green house, mulching film)

Packaging film.

2) Moulding.

Cans, Bottles, Yoys.

3) Moulding

Household ustensils and appliances, Loys

4) Underground piping for water.

Hoses for Irrigation.

5) Cables.

Insulation for electric cables.

Insulation for TV antenna cable.

6) Coating.

On paper, on aluminium.

7) Roto Moulding.

By using ldpe power

Large size of hollow pieces.

To keep the polye hylne at the high level required, the laboratories carry out contious checking on the polymer by using automatic samples.

This quality control makes it possible for the production division to obtain information establishing conformity of the resin to the required standard and making it possible. If needed to adjust the polymerization condition. After homogeniazation the laboratory carries out a second quality control chck to attribute the final lobel of quality. Thus only product of first choice is classified. Any defect will conduct of the rejection of the batch.

Low density polyethylene will be marked by Cdf Chimie, which will bring its support for technical assistance to the final users, in helping them to have best profit when processing the products.

AN INTRODUCTION TO QAFCO.

Our purpose is to give a brief information about Qatar fertilizer company the intention behind the project, the operations going on, the products and the marketing.

QAFCO was estabilished in 1969 following the advise and decision of H. H. Sheik Khalifa bin Hamad Al Thani, the Emir of Qatar.

The company forms and inportant part of the industrial development based on the natural resources of Qatar. Constraction of the first plant was done in cooperation between QAFCO, GIBB-EWBANK, U. K., DAVY POWER-GAS Ltd, U. K., and HAMBRO BANK Ltd, U. K.

The company forms an inportant part of the industrial development based on the natural resources of Qatar. Constraction of the first plant was done in cooperation between QAFCO, GIBB-EWBANK, U. K., DAVY POWER-GAS Ltd, U. K., and HAMBRO BANK Ltd, U.K.

The second plant was constructed in cooperation between QAFCO, NORSK HYDR a,s, NORWAY, DAVY POWERGAS LIMITED, CONSTAIN PROCESS ENGINEERING AND CONSTRACTION Ltd, U. K., CHIYODA CHEMICAL ENGINEERING AND CONSTRACTION C. O. Ltd HAMBROS BANK.

The State has made a major contribution to the project and its active interest and cooperation is vital to the company. The succesful development of the companies operation depends fondanentaly on the diligent and dedicated ser vice of our employees developing skills and relations at all levels and maintain the best relationship with the society in general is amongest the companies prime objectives.

THE PROCESS.

Natural gas from the oil fields in Dukhan is the row materials for production. Small amount of sulpher compounds mainly H_2S in the feed gas are removed in sulpher removal plant, the gas is then passed to the reforming section, where gas isteam and reacts at high temperuture and the process of catalist to form basically carbon monoxcid (co and hydrogen.). The nitrogen needed for the amonia reaction is introduced through the air.

The reformed gas passes through various conversion and purification stage in the CO shift, CO contained in the gas, is convertedinto hydrogen and CO_2, the CO_2 is removed in the CO_2 removal and used as raw materials for urea.

After another conversion stage the methanation where traces of CO and CO_2 are removed, the gas is compressed and let to the amonia synthesis section where it is converted to amonia at high temperature and pressure (approximatly 800 F, and 3100 psi)

Liquid amonia and CO_2 are the two components used in the urea production. These components are introduced in the urea autoclave at high pressure to form urea.

The liquid living the autoclave goes to the decomposition section where exessamoni is recovered and tured to the synthesis.

After filtration, a crystalling and centrifuging, the urea crystals are melted and prilled in a prilling tower to form a free following final products. From the base of the prilling tower this products are conveyed to the bulk storage.

THE FINAL PRODUCTS.

Amonia is shipped from QAFCO in a liquidsa state colled down to 34C in special "liquified gas tankers." Amonia is used as a raw material for the production of various grades of chemicals. The main consumer is the fertilizer industry. Liquid amonia can also be used directly as a nutrient. The major part of the world's ammonia raw producation is based on petrochemical raw materials as oil, naphta or natural gas.

FERTILIZER GRSDE UREA.

Urea is a fertilizer product of increasing importance. The product has a netrogen vontent of 46.3%, which is more than any other ferti izer product. This means a saving in transportation costs as fewer bags are needed for the same amount of nitrogen, prilled ureahas good chiping qualities. It is free flowing and can easily be spread by hand or by mach-anical means and it may also be used as spray solution alone or in combination with ether nutrients.

INDUSTRIAL DEVELOPMENT

KINGDOM OF SAUDI ARABIA

I INTRODUCTION

The Kingdom of Saudi Arabia's overall plans and objectives for national development include economic, social, and physical programs. An essential goal of these plans is the expansion and development of the industrial sector and the creation of more investment opportunities in an increasingly diversified economy. This industrial development will naturally be based on the abundant oil and gas resources to convert them into high value manufactured and processed products.

The Government's industrialization strategy aim at allocating these basic industries throughout the Kingdom. Jubail on the Arabian Gulf and Yanbu on the Red Sea were chosen for this industrial program.

The Jubail Industrial City is a major element in Saudi Arabia's plan for industrialization. Jubail was chosen as the east coast location for a large oil refining, petrochemical, and metallurgical complex because of its proximity to vast petroleum and natural gas resources, its proximity to the population centers of Dammam, Dhahran, and Al-Khobar, and a coastal location with deep navigable waters. The Jubail Industrial City occupies a site of approximately 80 km^2.

The major elements of the Jubail Industrial City are:

1. Primary Industries Area
2. Secondary Industries Area
3. Support Industries Area
4. Industrial and Commercial Ports
5. New Residential Community
6. Infrastructure and Construction Support Facilities

The primary industries are the economic heart of the Jubail development with its hydrocarbon based and heavy minerals installations. A total of sixteen primary industries are planned. These include two oil refineries, one lubricating oil refinery, a bulk petroleum storage facility, four petrochemical plants, two methanol and two fertilizer facilities, polyisoprene and petroprotein plants, an aluminium smelter, and a steel mill.

The primary industry will provide refined oil products, metals, agricultural and other products. A listing of these primary industries and their projected production follows:

PETROMIN SHELL REFINERY COMPANY

Naphtha

Low Sulphur Gas Oil

Auto Diesel

Fuel Oil

Long Residue

Dual Purpose Kerosene

Benzene

Benzene - Toluene

Liquified Petroleum Gas

Marine Diesel

JUBAIL LUB OIL REFINERY

Lube Oil Stocks - SNO 100/150
SNO 300/500
SNO 800/160 BS

Slack Wax

Fuel Oil

Asphalt

SAUDI PETROCHEMICAL COMPANY

Caustic Soda

Styrene

Ethylene Dichloride

Crude Industrial Ethanol

Ethylene Gas

Benzene/Toluene

ARABIAN PETROCHEMCIAL COMPANY

Ethylene

M.E. GLycol

D.E. Glycol

T.E. Glycol

Low Density Polyethylene

Hi Density Polyethylene

AL-JUBAIL PETROCHEMCIAL COMPANY

Low Density Polyethylene

EASTERN PETROCHEMCIAL COMPANY

Ethylene Glycol

Di Ethylene Glycol

Tri Ethylene Glycol

Low Density Polyethylene

NATIONAL METHANOL COMPANY

Methanol

Vinyl Acetate

Acetic Acid

Ethylene Acid

Ethylene Glycol

SAUDI METHANOL COMPANY

Methanol

AL-JUBAIL FERTILIZER COMPANY

Urea

SAUDI IRON AND STEEL COMPANY

Sponge Iron

Steel Billets

Rods and Bars

Wire Coils

Scheduled start of production for these industries ranges between early 1983 to 1986. The other primary industries are planned for the near future.

II ORGANIZATION INVOLVED IN INDUSTRIALIZATION PLAN

The task of implementing the plan for Jubail Industrial City is entrusted to three Government agencies:

- The oil and lube oil refineries and the bulk storage facilites are the responsibility of The General Organization for Petroleum and Minerals (Petromin). It has also the responsibility of gathering, treating and distributing associated gas.

- The Saudi Basic Industries Corporation (SABIC) is encharged with the task of implementing, operating and marketing the products of the hydrocarbon and mineral-based industries listed above.

- The third government agency involved in the industrialization plan is the Royal Commission for Jubail and Yanbu. Appointed by royal decree, the Royal Commission was given the responsibility for planning, designing and building the physical infrastructure and the overall management of Jubail and Yanbu induustrial cities.

III FUTURE PROSPECT OF PETROCHEMICAL INDUSTRIES IN JUBAIL INDUSTRIAL CITY

As the primary industries become operational, a variety of refined oil, petrochemical, metal and agricultural products will be available for use as feedstocks and materials for downstream industries. Various intermediate industries will emerge as a natural growth of the primary industry development.

These secondary industries will consist of manufacturing, blending and fabricating plants for petrochemicals, plastics, steel and other miscellaneous products.

Petrochemical Intermediate Industries

The petrochemical intermediate industries will form the link between the primary petrochemicals and final product sectors of the Saudi Arabian economy, with a projected total production volume of approximately 1,860,000 tpy.

The viability of these plans is related to the market competition that can be projected in the export sector, since most of the Middle Eastern petroleum producing countries are embarking on petrochemical industry development programs.

The earliest petrochemicals development is projected to include the following products:

PVC

Formaldehyde/Urea

Formaldehyde Resins

Polystyrene

SBR (Styrene Butadiene Rubber)

Carbon Black

Melamine

Terephthalic Acid-Polyester

Nylon

Propylene and Propylene Derivatives

These materials are of major importance in the construction and home products sector, and will present significant opportunities for import substitution.

Plastic Intermediate Industries

The plastic products industry is expected to develop utilizing the output of the petrochemical intermediate industries and will fill a maximum annual demand of 500,000 tpy in the home market and 300,000 tpy in exports. These production levels for 1995 are expected to develop in the following major markets:

Construction: Industrial, Commercial, Residential

Education

Medical Care

Food and Beverage Packaging

Housewares

Furniture

Agriculture and Horticulture

Leisure and Sports

These markets may be covered by manufacturing units that could be located at Jubail.

Paints and adhesives polymer demand is projected for construction, household products, and other sectors. These products can be essential for steel coatings, sealing, pipe joining, product laminating and as solvents in paints. A total demand of 6,000 tpy for paint resins and 3,000 tpy of adhesives is projected.

Other industries that could locate at Jubail to take advantage of feedstocks, energy, transportation and other infrastructure include:

a - Synthetic Detergents

Linear alkyl sulfonates, contributing up to 70 percent of the active ingredients in UK and US detergents could be synthesized from available petroleum products, hydrogen, sulfur and caustic soda.

b - Synthetic Fibers

Synthetic fibers for domestic use and export should include polyester, acrylic and nylon for use in wearing apparel, home furnishings, and industrial sectors.

c - Synthetic Rubber and Tires

Synthetic rubber, mainly SBR - styrene and butadiene rubber, could be made if a tire industry serving the Saudi and other Mid-East markets could be joint ventured. A demand of 4 million tires in Saudi Arabia is anticipated by 1995. The minimum size tire factory is about 1 1/2 million units/yr, so that considering the demand, the feasibility appears favorable at some time in the future. For an earlier start, a multi-national joint-venture may be required to assure minimum economic size of an SBR plant, which would be 40,000 tpy.

In general the selection of potential secondary industries for Jubail is based on market analyses and projections of demand for intermediate products and consumer goods, as well as the projected availability and character of feedstock from the primary industries and other sources. Their selection is also based on the opportunities for regional and world marketing.

The Royal Commission have adopted the following criteria for determining the suitability of potential secondary industries for Jubail:

- Feedstock relationship with the primary industries
- Use of other resources of the Kingdom
- Import substitution
- Increased participation by Saudi private sector in the industrial development of the Kingdom
- Development of Saudi management, technical and industrial manpower
- Development of export opportunities for Saudi Arabia - produced petroleum derivative products, metals and other products

IV PARTICULAR PROBLEMS TO BE FACED

As the implementation of the first group of basic industries got underway, the Royal Commission was engaged in preparing plans, designs and development schedules for the secondary industries zone.

To do this, the Royal Commission had to identify potential candidate industries which will form the basis of the layout and design of the secondary industries park. The process of identification was and still is a major problem facing the management of Jubail Industrial City. The process can be summarized as follows:

1. Identify industries that meet the criteria of the Royal Commission for downstream use of primary products, production of intermediate products, import substitution and resource use.

2. Identify the output, land requirements, feedstock materials relationships, transportation, utilities, employment and other needs of the candidate industries that directly influence physical layout and engineering.

3. Identify constraints and opportunities that may evolve for further development.

4. Provide guidelines for identifying the types of industries that should be attracted and identifying the benefits that would be available to them.

As a result of the above, a number of candidate industries was identified and categorized into groups. The land area requirements, utilities requirements and operating characteristics of each individual plant were obtained from published data,

from information supplied by process licensors, equipment manufacturers or individuals with personal experience in the design of particular industries. Various assumptions were used in the making of these estimates but enough flexibility exist in the design of the industrial park to cope with these unknown factors.

V THE ROLE OF THE ECONOMIC DEVELOPMENT DEPARTMENT

As stated above, one of the Government's main objectives is the increase and encouragement of Saudi private sector participation in the industrial development of the Kingdom.

The developments in Jubail Inudstrial City in general and the secondary industries in particular will meet this objective by creating more investment opportunities for the private sector. The Royal Commission, which is responsible for the overall management and development of Jubail Industrial City has created the Economic Development Department (EDD) to be the liaison between the private sector and the Jubail project.

The role and responsibilities of the EDD is to promote, plan and coordinate industrial and commercial opportunities and activities on the one hand. Guide, attract and evaluate private sector participation in these activities on the other.

As a Director for the Economic Development Department, I am responsible for the economic development of Jubail Industrial City through supervision of activites of groups performing the function of industrial, commercial and residential development. Also, I am responsible for liaison with other departments in the Royal Commission to ensure the economic development objectives are met.

My primary duties include:

- Direct and coordinate administration of the economic development of the city in accordance with policies determined by the Royal Commission

- Plan for future development of urban and non-urban areas by conducting research which defines appropriate industrial and commercial activities

- Prepare and release reports, studies and publications. Promote the advantages of Jubail which will attract population and appropriate secondary and support industries

- Recommend leasing and sale pricing policies which are consistent with the intended growth of the industrial city

- Lease or sell real estate, buildings, compounds or other facilities

H. A. Al-Hamdan
Director, Economic Development Department

PETROCHEMICAL INDUSTRY IN SUDAN

As a developing cauntry, SUDAN industrial activities are limited to agroindustrial activities. Vegetable arts, food industry and textile dominate the industrial secter. This is due mainly to the fact that the raw materials of these industries are available. Also the capital and technical knowhow needed by this industry is limited other industries such who petrochemical are not known there due to the nonarailabrihity of then new materials. Again the type of this industry requires lange spending and high technical knowhow. Although SUDAN has a nefinary which process cride oil and no use is being made of the byproducts of this nefinary due to the laek of tereign aumency in the crintry.

UREA PLANT :-

But inspite of that fact, recenthy a plant to process naphtha is being set up near Khartorum, the capital of SUDAN. As it is Known SUDAN depends mainly on agneuttune agrieultune and hence fietilizens is the most necessary item needed to be imported to raise the richness of the Land. These agrieultunal products are being grown mainly in the central region new Khentorion. This is the reason why the Urea Plant is being located new khartoum. Again its position is at the cenminal of the Pipeline which runs from Portsudem Refinary up to KKhanturm to transport the witht products - gasoil and weght tuel - hence they can make use of the pipe cine to transter naphtha from the netinary to the plant.

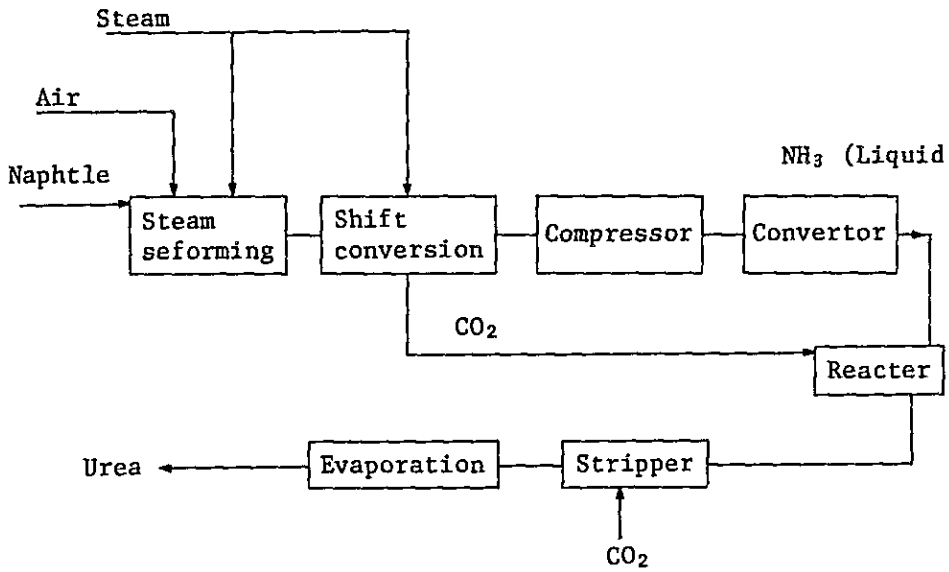
Plant process and Capacity:-

The plant is being designed to produce soo ton of fertilizer per day. Steam neforming of naphtha is to be used as the

process for production of Ammonia and then mmonia to react with Carbon dioxide to give urea. This is known as the Imperial chemical Industries. A diagrame illustrating the general process is given below.

Present situation:-

As it is already known now, oil has been discovened in SUDAN. In a conple of year SUDAN will stant exporting oil through a pipeline which runs from the oil fields in the south up to the Port at the Red Sea. A total summ of 650,000,000 US$ has been aloted to fenance this project the pipeline will be of 100 lbb/day capacity. Also a project to install a new Refinary in the middle negion near Kosti town is under investigation. This insure a bright futune for petrochemical industry in the country. Since we all know that oil is the backbone of this industry adding to this Natural gas is found on the Red Sea.



Summary of Urea Manufactury

Minimum Production of Natural Gas at the Red Sea

Position	N. G. Ft^3	Light Crude
Sawakin	6,900,000	$ 1158 lbb/day
Bashien	9,800,000	-

Port SUDAN Refinary output*

LPG	5,100	Ton/yen
Benzine	12,300	"
Kerosene	32,741	"
Naphtha	32,741	"
Gasoil	319,314	"
Diesel	32,000	"
Furnce oil	185,000	"
Naphtha extra	10,000	"
Waste + Refinary usage	303,800	"

* The refinary was built 1965 and already facing a lot of problem since most of it showld be technical depreciated by now. Also it derign is according to the Urebean stile.

Existing Problems:-

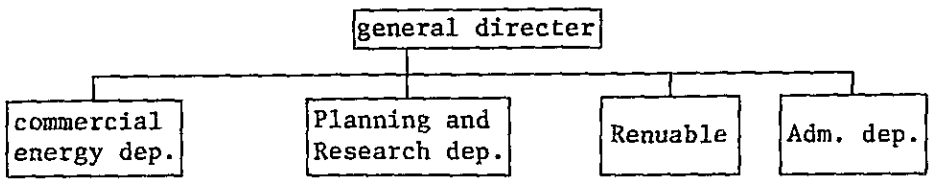
As it has been mensioned above petrochemical industry requires luge amounst of money and SUDEN is still cenable to supply such fends to enter this field. The petrochemical plent beeing installed now is still facing this problem and production has been delayed almost for more then two years. This delay always result in inevease in production since equipment and labom are just being idel. Again no feinds are available to train the Local Engineers and workers. Again this

always results in bad performance later when production will be started.

My Irganization:-

Before Joing the National Energy Administaration 1 had been at the Ministry of Industry, Industrial control depontent. I joined the National Energy Administration one year age. N. E. A. is a new organization within the Ministry of Energy. The department is to administer and plan for all energy isones in SUDAN Also to follow Energy Consermption and promote the energy efficiency though energy conservation programes. Also one of the majorn field the department is responisible is the industrial secter Energy. The Administration is dieided into form departments as follows

1- Planning and Research dep.
2- Commercial Energy dep.
3- Renuable and New Source of Energy dep.
   (soler, nuclen, biomass etc)
4- Administration dep.



-Electricity	-national planning	-soter	-administry
-Detradeur	-Regional "	energy	-financial
-Enduse	-Energy costing	-wind "	-training
a- industry	-Statistic and	-viomass	-General
b- agriculture	information	-viogass	relation
c- household	-Especial task		
	-Projects evaluation		

mypoortion is the head of this unit

ISMAIL ELSHAFEI
Nationa Energy administration
SUDAN

COUNTRY REPORT

VENEZUELA

Nelson Della Rocca

The Petroguimica Nacional was cleated in 1953 with the intention of more products from natural gas reservoins.

The sucess teached by Petrochemical Industry begining at 1920 opened the doors for the cieations, by the goverment, of the Petrojuimica Nacional.

The Petrochemical Industry more, trough several tranformations, a wide variety of products such as plastics, tires, sintetic fibers, fertilizers, solvents, etc with are used massively.

In our country, Venezuela, Petioleos de Venezuela have, as other fonctions, the responsability of the planifications and establishment of the general rules of this industry. This is done using a filial branch PEQUIVEN, Petrojuimica de Venezuela, S. A.

For the elaboration of petrochemical products PEQUINEN have two complex, one is located at Moro's, Estado Carabobo, wich is engaged of the production of fertilizers, nitroges fertilizers and phosphate fertilizers, and industrial products. The second Complex is placed at El Tablazo at the border of the Lago de Maracaibo wich main production is olefins, ammonia and urea.

Also have participation on other industries, foreign or private nationals, such as:

Oxidor at Valencia Venezuela
Quimica Venoco at Valencia Venezuela
Ferralca at Moro's Venezuela
Produven at Moro's Venezuela
Tripoliven at Moro's Venezuela

Estizulia at Tabbzo Venezoela

Polilago at Tabbzo Venezuela

Quimica Venoco at Tabbzo Venezuela

Monomeros Colombo Venezulanoz Colombia

The petrochemical industry in Venezuela have about 2200 employees wich work at Caracas, Moion, Tablazo.

There is a moving of some offices from Caracas to Maracaibo in order to contribute to take off the crowding of the metro politaneas area.

At complejo Moro's we have the following products:

Ammonia

Uria

Ammonium Sulfate

Phosphoric Acid

Sulfuric Acid

Nitric Acid

Oleum

Fertilizers

Alominium Sulfate

Chbride flooridemethanes

Sodium Tripoliphos fate

At complejo Lulia we have the following products:

Ammonia

Urea

Ethilen

Propilen

Cloride

Caustic Soda

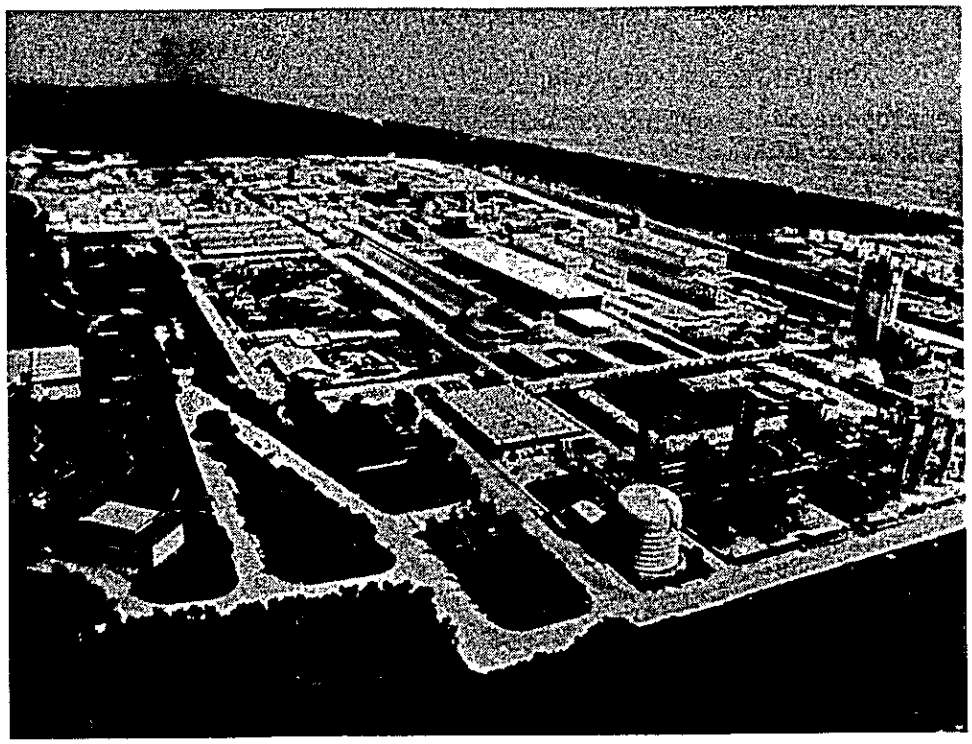
Sodium Hiplocloride

PVC

Low density poliethles

Propilen treatrameros

COMPLEJO MORON



The complejo Moro's is located near Puerto cabello's beach. Nowadays the employees number is about 1000.

Ammonia Plant

At Moron the ammonia is the source to make compoonds witch contain nitrogen like urea, amonium sulfate, nitric acid, diamonium phosphate.

The Ammonia Plant have an installed capacity of 198,000 TMA (metric tons year) and was constructed by Mitsubishi Heavy Industries using the process of Chemico.

The raw material is Natural gas.

The CO_2 byproduct is sent to the Urea Plant.

Urea Plant:

Have an installed capacity of 248,000 TMA. The process is property of Sram Progetti (cristalizations and prilling). Uses ammonia and carbon dioxide.

Ammonium Sulfate Plant:

Montecation process, with an installed capacity of 79,200 TMS. The start up was in 1963. Sulfuric Acid and Ammonia are used as raw material.

Nitric Acid Plant

Produces nitric acid by means of the cataletic combustion of the ammonia (Fauser Montecatini process).

The capacity is 61000 TMA (nitric acid 53%) and 9900 TMS (nitric acid 98%)

Sulfuric Acid Plant

The phosphates fertilijers are done by using sulfuric acid.

A Monsanto process, uses sulfur as raw material, from desolforigers, and have a capacity of 198000 TMA (sulfuric acid 98%) and 16500 TMA (oleum). Is a simple contact plant.

Phosphoric Acid Plant

With a capacity of 82500 TMA uses sulforic acid and phosphate rock as raw material in a wet process (Dorn Oliver Inc.).

The acid strength is 54%.

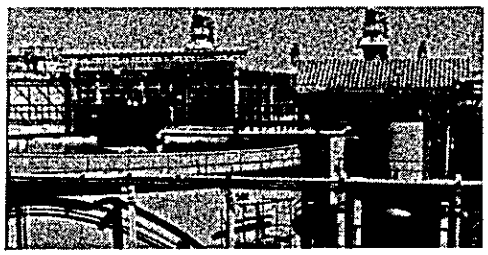
Fertilizer Plant

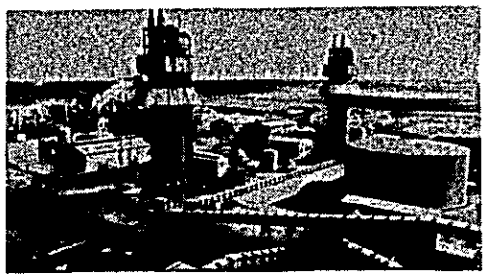
This plant have the main featore on his versatitity. We can more 290000 TMA of diamoniom phosphate, 303600 TMA of NPK (nitrogen, phosphate, potassion compond) and 462000 TMA of super phosphate granulated.

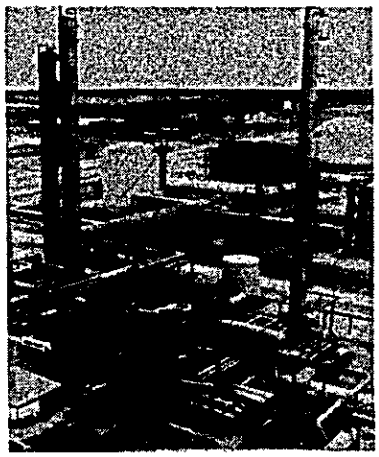
The raw material is phosphoric acid, sulfuricacid, ammonia.

Is a Dow Oliver Inc process.

COMPLEJO ZULIA EL TABLAZO







The complejo Lulia El Tablazo is placed at north of Puertos de Alta gracia on the east side of the Lago de Maracaiko.

The constructions of this complego began in 1969 the main protion of him was concluded on 1973.

The complejo Lulia have an extension of 848 hectareas (1 hects 100 areas) and have enough surface to accept the extension (ampliations) of the existing plant as others that may be constructed in the future.

Caustic Soda and Chloro Plant

This plant have an installed capacity of 40000 TMA (Chloro) and 45000 TMA (Caustic Soda). The raw materia is comun salt. Is a Oronzco de Nora process.

Olefins Plant

The olefins plant was designed by Kellg Co., and uses as raw material ethane, propane from a processing gas plant near from Tabbzo.

This plant may produce 150000 TMA (ethilen), 94000 TMA (propilen) when uses propane as raw materia.

Ammonia Plant

El Tablazo have two ammonia plants with C & I Girdler Inc. process with a capacity of 297000 TMA each one. Uses natural gas as raw materia.

Urea Plant

Two urea plants designed by C & I Girdler Inc. with an installed capacity of 396000 TMA each one.

The urea produced at Moro's is for internal use (countre) and the urea produced at Tablozo is for exportations.

PVC Plant

Have a capacity of 40000 TMA of polivinil chloride resins and uses as raw materia cloro and ethilen from chloro Soda and Olefins plants respectively.

Petroguimica de Venezuela also have participation on the so called "Empresas Mixtas" like

Oxidor Deguiven have a 11, 43% of share of stock. This plant have an installed capacity of 12000 TMA of pflatic anhidrid,

Quimica Venoco, C.A. Peguiven (Petroguimica de Venezuela) participates with a 15% of capital. Produces dodelibenzene

Produren 50% of Deguiven's capital makes 9000 TMA cloro-flooro methune

Ferralca 85% of the share of stock belongs to Deguiven. Makes 30000 TMA Cluminium Solfate.

Tripoliven Makes Sodium Tripoliphosphate (30000 TMA) and Peguiven have the property of 33 1/3% fo this industry.

Polilago 59000 TMA of low density polietiles (40% Peguiven)

Estizulia 40000 TMA of poliesthiren (37.5% Peguiven)

Monomerus Colombo Venezolanes Located in Colombia have an installed capacity of 16500 TMA (Caprolactam) and 290000 TMA (Fertilizers NPK). Peguiven's participation reaches 40.1%.

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