We **Refine** Right

Abu Dhabi Oil Refining Company (Takreer)

INTRODUCTION

The Abu Dhabi Oil Refining Company (Takreer) was established in 1999 to take over the responsibility of refining operations previously undertaken by the Abu Dhabi National Oil Company (ADNOC). The company's areas of operation include the refining of crude oil and condensate, supply of petroleum products and production of granulated Sulphur in compliance with domestic and international specifications.

Takreer is responsible for developing the refining industry, which started with the establishment of Abu Dhabi Refinery in 1976 and Ruwais Refinery in 1982. The company is also in charge of implementing national strategies aimed at enhancing the role of downstream industries in the local economy.

Aiming at becoming a leader in the oil refining business, Takreer is now working on expanding its activities in the downstream sector. It is also exerting all possible efforts to face the challenges of the 21st century in a rapidly-changing market. Besides meeting growing demand for enhanced products and services, the company is playing a positive role in advancing the local economy and boosting the national income. In fact, Takreer is now in the process of implementing a series of new and ongoing investments that will help the company realize its goals for the future.

The company's objectives for the new millennium include the task of fulfilling national aspirations for quality assurance and environmental protection. It is also keen on implementing national policies aimed at providing employment opportunities for the national workforce. To achieve that, Takreer has designed a number of special development programs for UAE Nationals to provide them with the necessary skills to join the workforce.

Meanwhile, Takreer conducts high standard and efficient refining operations consistent with sound health, safety and environmental practices. Its activities are based on total quality management principles, in a customer and employee oriented environment. Its aim is to provide reliable, quality products that satisfy the requirements and needs of its customers and partners.

In the future, Takreer will work on enhancing its performance to meet its overall objectives. It will also improve its cost control and adopt state-of-the-art equipment and technology to optimize its operations.

ORGANIZATION

Takreer's main organization structure consists of seven divisions. These are:

- Finance Division
- Human Resources & Administration Division
- Engineering & Projects Division
- Ruwais Refinery Division
- Abu Dhabi Refinery Division
- Procurement & contracts Division
- Business Support Division

CORE BUSINESS

The Ruwais and Abu Dhabi Refineries constitute our core business. They are referred to as the Takreer's Business Line. They produce over 23 million tons per year of products for the local and export markets.

ABU DHABI REFINERY

Following the discovery of oil in Abu Dhabi in 1958, and the first export shipments of crude in 1962, plans were drawn up for a grass root refinery with a capacity of 15,000 barrels per stream day (bpsd) to meet a growing local need for petroleum products. Construction work on the project began in 1973 and the refinery, costing an initial $45 million, was inaugurated in April 1976.

So rapid was the growth in demand for oil products, however, that work began almost immediately on installing additional capacity to process a further 60,000 BPSD and this was commissioned in 1983.

Requirements continued to grow in the fast-developing Emirate, and ADNOC decided to expand capacity yet again, with environmental considerations in mind, to include additional units for Gas Oil Desulphurization and Sulphur recovery. The expanded Refinery started up in December 1992 with a rated capacity of 85,000 BPSD.

A Salt and Chlorine Plant, commissioned at Abu Dhabi in 1981, was merged in 1990 with the Refinery to form the Abu Dhabi Refinery and Chlorine Division.

Subsequently it was permanently shutdown on 30th November, 2001. Two power plants, owned and operated by Abu Dhabi Power Company, and a Lube oil blending/filling plant, owned and operated by ADNOC Distribution, are located adjacent to the Refinery.

REFINERY INSTALLATIONS

The refinery is a Hydro Skimming Complex designed to process Bab Crude as well as a mixture of Asab-Sahil, Shah and Thammama Condensate. Finished products from the Refinery are as follows: Liquefied Petroleum Gases, Naphtha, Unleaded Gasoline, Aviation Turbine Kerosene, Domestic Kerosene, Gas Oil, Straight Run Residue, Liquid Sulphur.

Refinery units include:

Crude Distillation Unit (85,000 BPSD): As a first step, prior to the actual distillation process, Crude Oil is passed through a Desalter Unit to remove the undesirable salts, water and sludge which are generally associated with any type of crude. After final heating in a furnace, the Crude is then fractionated in the Atmospheric Distillation Column into the basic raw petroleum fractions of Naphtha, kerosene, Gas Oil and Straight Run Residue.

Naphtha Hydrodesulphuriser Unit (22,795 BPSD): The Naphtha Hydrodesulphuriser sweetens the Straight Run Naphtha from Crude Unit. Three products are produced in this unit namely, Heavy Naphtha, Light Naphtha and Sour Liquefied Petroleum Gases.

Kerosene Merox Unit (21,250 BPSD): The unit converts Mercaptans in straight run kerosene into disulphide to meet the final product quality for aviation kerosene.

Catalytic Reformer Unit (14,000 BPSD): The Reformer processes the Heavy Naphtha cut to improve its anti-knock properties prior to using it as a Gasoline blending component. The unit is a continuous regeneration type and does not need to be shut down periodically for regeneration of catalyst.

Gas Oil Hydrodesulphuriser Unit (22,500 BPSD): The Gas Oil Hydrodesulphuriser Unit reduces Gas Oil sulphur content to 0.15 wt% to improve product quality.

LPG Treating and Recovery Unit (3,480 BPSD): Raw LPG from Naphtha Hydrodesulphuriser and Catalytic Reformer Unit are processed in this unit. Butane produced is used as a blending component in Gasoline and also blended with Propane to form LPG for domestic use.

Excess Naphtha Stabilizer Unit (3,325 BPSD): Excess Naphtha from Crude Unit is stabilized prior to export to Ruwais Refinery.

Gas Sweetening Unit (35 tons/day H2S Removal): Sour Gases produced in the Refinery facilities are sweetened using amine solution to remove hydrogen sulphide to minimize sulphur oxide emissions.

Sulphur Recovery Unit (35 tons/day): The acid gases produced from Gas Sweetening Unit are converted to liquid sulphur, which is then transported to Ruwais Sulphur Handling Terminal via road tankers.

Jarn Yaphour Crude Oil Stabilization Plant (10,000 BPSD): The Oil/Gas Separation Plant is designed to stabilize Crude from Jarn Yaphour Wells, located some 30 kilometers from Abu Dhabi. The separated gas is further treated to remove hydrogen sulphide, water and hydrocarbon condensate before it is injected into GASCO's Main Gas Network. The Stabilized Crude is sent to the Refinery Crude Distillation Unit for further separation into petroleum fractions.

Additional Effluent Water Treatment facilities were installed to adhere to rigid oil in water specification of 10 ppm maximum.

RUWAIS REFINERY

Located some 240 kilometers west of Abu Dhabi City, the Ruwais Industrial Complex was developed as a major contributor to the national economy and represents a series of multi-million dollar investments.

The Ruwais story began in the 1970s, when plans were laid to transform a remote desert site into a self-contained industrial town, geared to fulfilling the down stream requirements of Abu Dhabi's booming oil and gas industry.

Centered around Ruwais Refinery, the complex was officially inaugurated in 1982 by His Highness Sheikh Zayed bin Sultan Al Nahyan, President of the UAE, Ruler of Abu Dhabi and the visionary behind Abu Dhabi's remarkable development and prosperity.

Soon after commissioning the original 120,000 barrels per day (bpd) Hydro skimming refinery in June 1981, plans were drawn up to add a 27,000 bpd Hydro cracker complex that was started in 1985. To consolidate operations, the General Utilities Plant, set up in 1982 to provide electricity and water for the area, was merged with the Refinery in 1986.

In support of the company's HSE policy, a central Sulphur Handling and Granulation Plant was established in 1991 to handle all the liquid Sulphur recovered in the GASCO and ADGAS Natural Gas Liquefaction facilities. Its operations were also integrated with the Ruwais Refinery Division in 1992. After its expansion in early 2001, the granulation capacity, at 7,650 tons per day, has become one of the largest in the world.

Two 140,000 bpd condensate processing trains were commissioned in year 2000-2002 to process condensate produced in the on-shore gas fields of Abu Dhabi. Currently these are two of the largest such condensate splitters in the world. Meanwhile, support facilities such as berths, power generation and water production facilities continued to be expanded to meet the growing needs of the industrial area.

The original Hydro skimming complex was designed to process 120,000 bpd of crude oil, mainly for the export market. Growth in demand for Abu Dhabi's high quality refined products spurred the continuous expansions at Ruwais.

Today the range of refined products includes Liquefied Petroleum Gas, Premium Unleaded Gasoline (98 Octane), Special Unleaded Gasoline (95 Octane), Naphtha grades, Jet-A1 and Kerosene grades, Gas Oil grades, Straight run Residue, Bunker grades 180 and 380 cst and Granulated Sulphur.

PROCESSING UNITS

These are produced by the following primary and secondary processing units:

Crude oil Distillation (120,000 bpd): After desalting, crude oil is distilled to produce full-range naphtha, kerosene, light gas oil, heavy gas oil and straight run residue, which are further processed in downstream units.

Naphtha Hydrodesulphurization (34,350 bpd): The full-range naphtha from the crude oil unit and heavy naphtha from the Hydro cracker unit is hydro treated to remove the Sulphur compounds and then LPG is stripped from whole naphtha. After dehydration, the raw LPG is sent to the GASCO-NGL plant for further processing while the whole naphtha is split into light naphtha, used for gasoline blending, and heavy naphtha, used as feedstock for the Catalytic Reformer Unit.

Catalytic Reformer (19,150 bpd): The heavy naphtha is processed to improve its anti-knock properties by using a bimetallic platinum-based catalyst. The Reformate obtained is used as the main blend component for gasoline production. The hydrogen-rich gas is used in the reaction sections of the hydrotreaters and the remaining gas goes to Refinery Fuel Gas system.

Kerosene Hydrotreater (20,780 bpd): The unit improves the burning quality of kerosene by desulphurization and saturation of aromatics required to meet international specifications for jet fuel.

Gas Oil Hydrodesulphurization (21,850 bpsd): The unit removes Sulphur compounds in the heavy gas oil from the crude oil unit using a cobalt/molybdenum oxide-based catalyst. The hydrotreated heavy gas oil is used as a blending component to produce different grades of gas oil.

Vacuum Unit (46,000 bpd): The Vacuum Unit processes atmospheric residue from the crude oil unit to produce heavy vacuum gas oil as feedstock for the Unibon unit. Ruwais residue is supplemented by residue from Abu Dhabi Refinery.

Unibon Unit/Hydro cracker (27,000 bpd): The Unibon Unit converts the heavy vacuum gas oil feed into lighter products in the reactor section by passing the feed, plus hydrogen, over catalysts under high temperature and pressure. The products from this reaction are then separated in the fractionation section to yield high value finished products ranging from LPG to gas oil.

Hydrogen Plant (60,000 Nm3/hr H2): The Hydrogen Unit converts natural gas and steam into hydrogen with the aid of catalysts. Propane can also be used as an alternative feed.

Two Sulphur Recovery Plants (44/50 tons per day): These units recover sulphur from hydrogen sulphide-rich gas produced in the Hydrodesulphurization and Unibon units by converting it into elemental sulphur through a thermal and catalytic reaction. The liquid sulphur is then sent to the Sulphur Handling Terminal for granulation and export.

Two Condensate Splitters (2x140,000 bpd): Each splitter is designed to process condensate from the On-shore Gas Development and Asab Gas Development fields. The splitters fractionate the condensate into unstabilized light naphtha, medium naphtha, heavy naphtha, kerosene, light gas oil (LGO), heavy gas oil (HGO), and atmospheric residue, which are further processed in downstream units.

Two Naphtha Stabilizers (2x27,500 bpd) Each Stabilizer is designed to process 27,500 bpd of unstabilized light naphtha from the condensate splitters. LPG after treatment is sent to GASCO while stabilized light naphtha is routed to storage and blending.

Two Kerosene Sweetening Units (2x52,000 bpd): Kerosene produced in the Condensate Distillation Units contains mercaptans and naphthenic acids. The Merichem Sweetening units reduce the mercaptans by converting them into disulphide. The sweetened kerosene from each unit is routed to storage and blending.

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