Approx 22,500 bpd Used Oil Refinery For Sale & immediate Relocation

Presented by PRIOS Industry Systems & Services Ltd. Germany
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Introduction

The refinery processed crude oil and produced finished products which supplied the energy requirements of the country, i.e. Liquefied Petroleum Gas (LPG) used as domestic fuel for cooking and heating, three grades of Gasoline, Aviation Turbine Fuel, Illuminating, Kerosene, Gasoil or Diesel, Light Fuel Oil, Heavy Fuel Oil and Bitumen.

The supply of crude oil to the refinery was the responsibility of the marketing companies.

Originally, the refinery was designed to process Kirkuk crude oil from Northern Iraq. In the absence of the design crude oil, the next best crude oil to meet the market demand is the Russian Export Blend (REB) and the Syrian crude oil which were the last main crude oils processed at the refinery.

During the period 1972 to 2002 the refinery processed 20 different types of crude oils totalling over 20,605,000 metric tons. Of this quantity, over 8 million metric tons was Russian crude oil.

The refinery was shut down in 2004 and has been dismantled already.

The annual capacity of the refinery

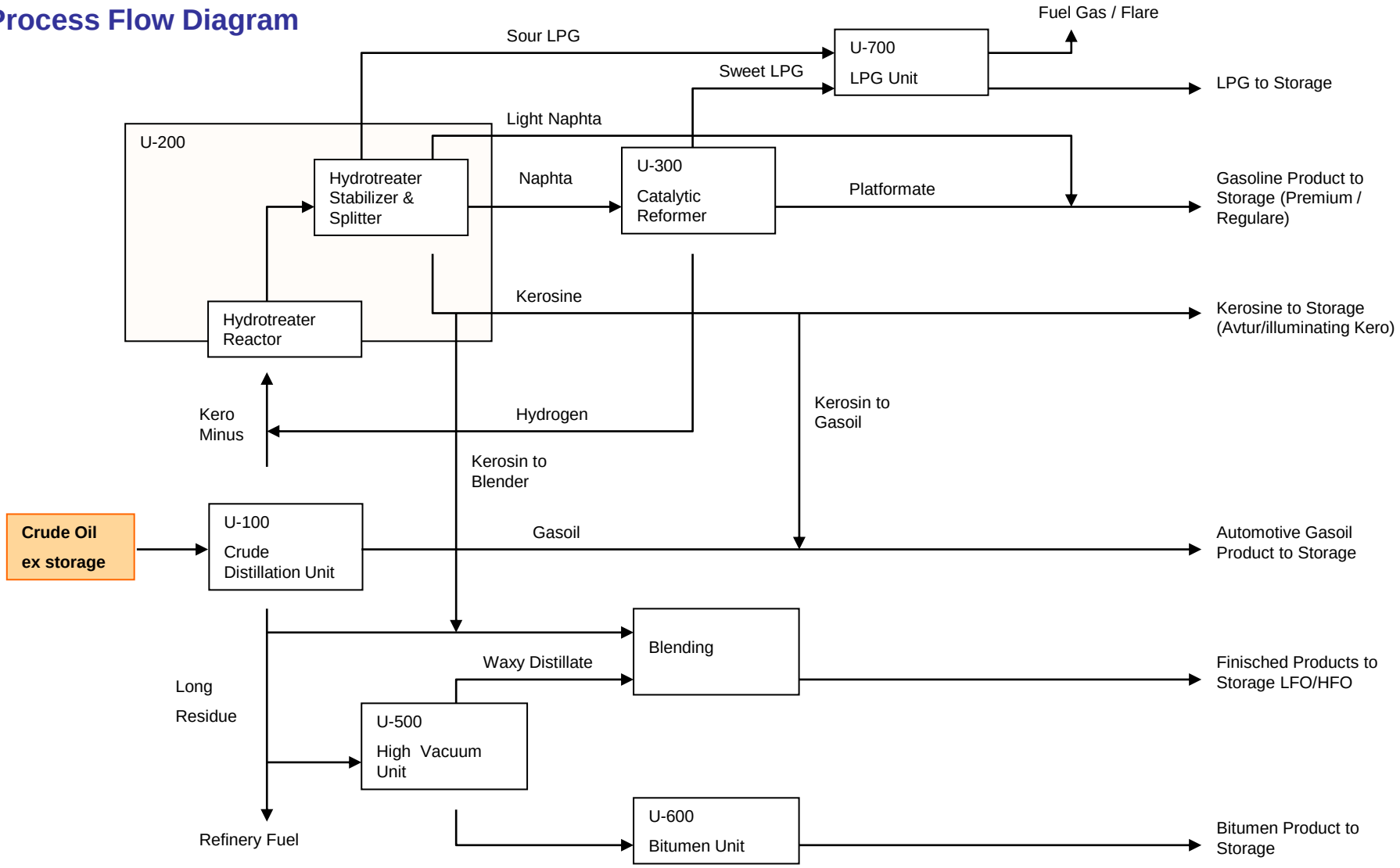
Refinery Product	Capacity tons
LPG	32,600
Gasoline 98 ON	106,500
Unleaded Gasoline 95 ON	47,500
Unleaded Gasoline 98 ON	0
Kerosene	12,000
Jet Fuel Oil	24,400
Gasoil	362,500
Light Fuel Oil	127,500
Heavy Fuel Oil	294,600
Bitumen	38,000
Naphta	3.8

The refinery had a design capacity of approx 1,200,000 tons of crude oil annually.

The Refinery comprised of the following units:

Unit Description	Pos.-No. In Flow Diagr.
Crude Oil Distillation	(U-100)
Hydrotreating	(U-200)
Platforming	(U-300)
LPG treating	(U-700)
High Vacuum Distillation	(U-500)
Bitumen Blowing	(U-600)

Process Flow Diagram



Unit Description

Fractional Distillation (Crude Oil Distillation U-100)

The first stage of the refining process separates the complex mixture of crude oil into groups of fractions of similar molecular weight. This separation is carried out in a distillation column by a process called fractional distillation . In this process the crude oil is first preheated in a series of heat exchangers. Ist temperature is then raised to about 360°C in a furnace. The hot vapour and liquid mixture which is formed is fed into the lower part of the distillation column.

In order to achieve the required separation, the inside of the column has a number of horizontal steel trays, each with a large number of valves and packings that permit vapour to rise upwards through them, allowing the condensed liquid to flow downwards. In addition, sections of the column are partly filled with structured and random packings. As the vapour passes throgh the liquid on each tray or bed of packing, it is dradually cooled and the less volatile compounds are condensed and join the liquid on the trays.

This liquid can then be drawn off and depending on the level at which it was removed from the column, is used either as a finished product, e.g. Gasoil, or it may require further treatment in other units. The most volatile hydrocarbons rise to the coolest part of the column at the top, before condensing, whereas the less volatile ones condense and are drawn off in the middle of the column. At the base of the column a viscous residue that does not easily vapourise is pumped away to storage or to other units for further processing.

The distillation column in the Refinery has 32 trays, each provided with 100-400 valves depending on ist position within the column and 5.5 cubic meters of structured and random packing.

Unit Description

Fractional Distillation (Crude Oil Distillation U-100)

Crude Oil is separated into the following fractions:

-An overhead fraction containing Gas, Light Gasoline, Naphtha and Kerosene, which is furhter treated in other units.

-A middle fraction – Gasoil

-A bottoms residue: Heavy Fuel Oil which can be used either as a finished product or as a blending component to produce Light Fuel Oil. Part of it is processed further to produce Bitumen.

Treating Process (Hydrotreating U-200)

Crude Oil always contains sulphur compounds. These are impurities which cause corrosion problems in the equipment when the end products are used, and which contribute to environmental pollution. These impurities must be removed so that products, such as LPG, Motor Gasoline, Aviation Turbine Fuel and Illuminating Kerosene are of the correct quality to meet market specifications and can be used without causing any problems.

The overhead fraction from the crude oil distillation unit is, therefore, processed in the Hydrotreating unit. Here the oil is vapourised, mixed with hydrogen and is passed through a reactor containign a Cobalt-Molybdenum catalyst. Under high pressure and temperature conditions, the sulphur is removed as hydrogen sulphide, part of which comes away in the LPG stream, and part in the light gas streams which are used as fuel.

Treating Process (Hydrotreating U-200)

The LPG stream is sent to the LPG Treating Unit where the hydrogen sulphide is absorbed by an amine solution, leaving the LPG free from sulphur. The Amine solution is then regenerated and used again, whilst the harmful hydrogen sulphide gas is removed and burnt in the heater of the crude oil distillation unit.

The purified hydrotreated liquid stream is separated, giving the following products/fractions:

-Light Gasoline component of relatively high octane number is sent to intermediate tankage for use as a bleding component to produce Gasoline.

-Naphtha is sent to the conversion unit and

-Kerosene is now a finished product and is sent to storage.

Conversion Process (Platformer U-300)

Naphtha, as produced in the Hydrotreater, has a low octane number which makes it unsuitable for use as a motor gasoline component. It is, therefore, put throgh a process whereby the octane number is greatly increased. The conversion involves a series of chemical transformations which take place in the presence of a catalyst Platinum and Rhenium. The process is knwon as Catalytic Reforming or Platforming.

In the Platforming process, the Naphtha is mixed with hydrogen rich gas and the vapourised mixture is passed throgh a fixed beds of catalyst which are contained in three reactors. The chemical conversions take place in these reactors at high temperatures, in excess of 500°C, and at a pressure of 25 atmospheres. The resulting product, Platformate, has a high octane number and is then blended with the Light Gasoline from the Hydrotreater to produce Gasoline.

Conversion Process (Platformer U-300)

The octane rating of Gasoline as produced from these two components is still lower than that stipulated in the product specification. In order to increase it to the required level a specially designed plant is used to blend Lead compund into the refinery Gasoline production.

The finished Gasoline is now ready for use. The two grades of gasoline produced have an octane number of 98,0 (Leaded) and 95,0 (Unleaded).

Bitumen Manufacture (U-500 and U-600)

Part of the bottoms residue from the distillation column is distilled further to prepare the feed to the bitumen production unit. This is done under vacuum conditions to prevent cracking.

The vacuum residue forms the feed to the Bitumen Blowing Column whilst the distillate obtained is used as a Light Fuel Oil component. In the Bitumen Blowing Column, air is employed to oxidize the residue and produce various grades of Bitumen (Asphalt), used mainly for road surfacing.

Utilities

The operation of the main units described earlier requires the use of fuel, electricity, steam, compressed air and seawater.

The fuel oil used in the refinery, which is agumented by fuel gas from the Hydrotreater and Platformer, is taken from the bottom of the crude distillation column and is distributed to the ten furnaces and two boilers in the plant.

When the refinery operates at full throughput, 900,000 - 1,000,000 kilowatt hours of electricity per month are required to drive the various pumps and other electrical equipment.

Production of steam requires fresh water which is scarce in the country. In order to overcome this problem and in spite of the high cost, the refinery operates two desalination plants which convert seawater to distilled water. This water is further purified in the Demineralisation Unit before it is used to produce steam in the two boilers. The steam thus produced is used for many purposes including heating and for stripping - i.e. sepraration of the different components in distillation column in addition, steam is used to drive the two steam driven process compressors, as well as certain strategic
turbine driven pumps that must continue to operate if an electricity supply failure occurs.

Two air compressors provide compressed air for the pneumatic process control system of the refinery.

Large quantities of seawater - some 70,000 metric tons per day - are circulated for cooling, primarily to reduce the temperature of products leaving different parts of the process units before they are pumped away to storage tanks. This seawater never comes into contact with oil, and is returned to the sea after chetking that it has not been inadvertently contaminated with oil. Air cooling is also applied instead of coolirig water at certain sections of the plant.

Utilities

In many parts of the udits, however, products are cooled by transferring their heat to the crude oil or to cold intermediate prbducts which require heating during the various stages of processing. This is carried out in 'heat exchangers'. In this way a significant proportion of the heat which has been channelled into the feedstock is recovered, and this reduces the total amount of fuel required in the refinery processes.

Throughout the refinery considerable fuel savings are made through Energy Management Systems and also through modifications to equipment as well as the insulation of pipes and vessels carrying products at high temperatures.

Process Control

The refining process is controlled by a highly automated and sophisticated electronic computerised system called the Distributed Control System or DCS.

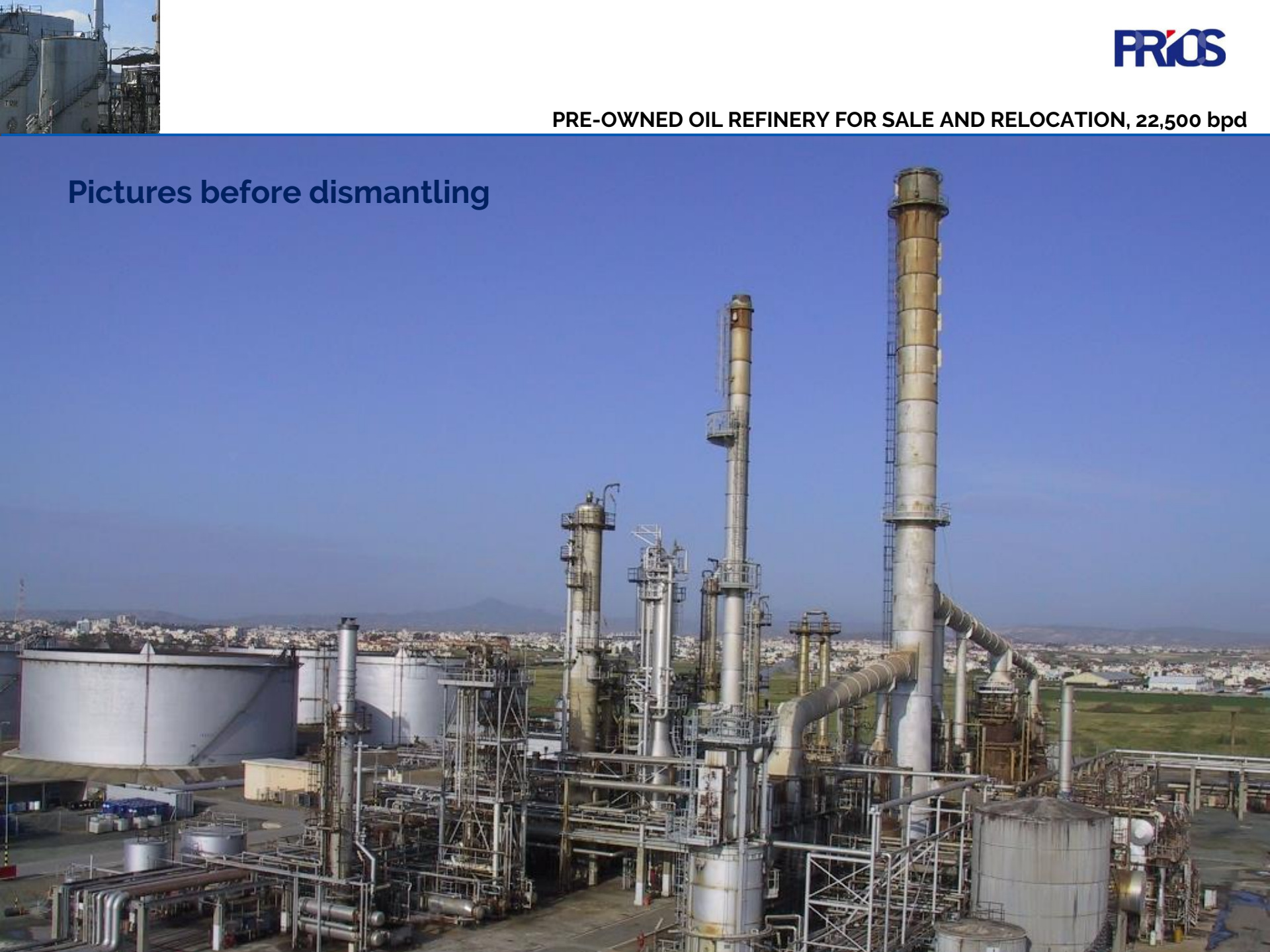
The process of refining crude oil into finished products is a highly sophisticated and complex operation. It requires a highly skilled labour force and a fully automated computerised system for controlling the various operating parameters such as flows, temperatures, pressures, levels in columns and vessels etc.

For this purpose the refinery, in 1996, installed the latest technologically advanced control system called the Distributed Control System or DCS. This system is a highly advanced electronic system caable of executing precision control and fine adjustments.

Process Control

It is a multifunctional and multivariable automated control system with graphical and audiovisual displays. Being electronic, it is a quick response system and the signal integrity is safer than its pneumatic predecessor. In addition it
provides the facility to record , store and retrieve information and data in a graphical or numerical form at any moment. Early warning systems are also incorporated into the system for the cases when upsets are experienced so as to effect early adjustments.

Pictures before dismantling



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PRE-OWNED OIL REFINERY FOR SALE AND RELOCATION, 22,500 bpd

Dismantling phase


22/09/2006


30/09/2006


17/10/2006

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Visual inspection

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