

## MELAKA REFINERY

SWEET AND  
SOUR TRAINS

All photos courtesy of  
Petronas and Petronas  
Penapisan (Melaka) Sdn Bhd



Crude Distillation Unit under the first phase of the Melaka refinery

**P**etronas' Second Refinery (PSR), located approximately 15km from the Melaka town, will process both sweet and sour crude oils. It sits on a 926 acre site in the Mukim of Sg. Udang and Tangga Batu which fronts the Straits of Melaka. With a combined capacity of 200,000 bpsd (barrels per stream day), it is the largest refinery complex in the country. The sweet and sour trains are two separate projects capable of independent stand alone operations. However, both share common facilities like utilities, offsites, marine facilities and effluent treatment.

Presently, the Melaka refinery complex is only half completed, in that only the

*The sweet and sour trains at the Melaka refinery are two separate projects capable of independent stand alone operations. Both have the same capacity of 100,000 bpsd and share common facilities like utilities, offsites, marine jetty and effluent treatment to achieve synergistic benefits.*

first phase (PSR-1) or the sweet train is operational. The sour train in the second

phase (PSR-2) is under construction, with stage one expected to be completed by the end of this year and stage two between 1999-2002.

Ownership structure of the two refineries differs. The first phase of the refinery is 100% owned by Petronas Penapisan (Melaka) Sdn Bhd (PPMSB), a wholly-owned subsidiary of Petronas. The sour train is owned by Malaysian Refining Company Sdn Bhd (MRC), a joint-venture between Petronas 45%, CONOCO (a subsidiary of CONOCO Inc. of the US) 40% and STATOIL (the national oil company of Norway) 15%.

The PPMSB refinery is designed to process light sweet crudes and





Sungai Udang Port



Storage tanks and pipelines at the Melaka refinery

feedstock, are produced. Medium naphtha is used as a blend component for motor gasoline, reformer feed and petrochemical feedstock. Heavy naphtha and condensate naphtha are sent to the hydrotreating process where impurities are removed before being fed to the catalytic reformer for the production of platformate. The latter is a major blendstock for the production of petrol. Some heavy naphtha is used for blending of dual purpose kerosene (used as jet fuel and illuminating kerosene). Diesel and Atmospheric Gas Oil (AGO) are blended to produce automotive and industrial diesel. At the bottom of the crude distillation column is reduced crude. This is extracted without further treatment and sold as low sulfur waxy residue

(LSWR) which may be used as fuel oil or feedstock for further processing. The various refined products (see chart 2) from the sweet train are targeted primarily for the local market.

The Melaka refinery also incorporates a lube blending plant. This plant has a capacity of 35,000 kilolitres per year of lubricant products of various types and grades. Initially, the base oils are imported. When

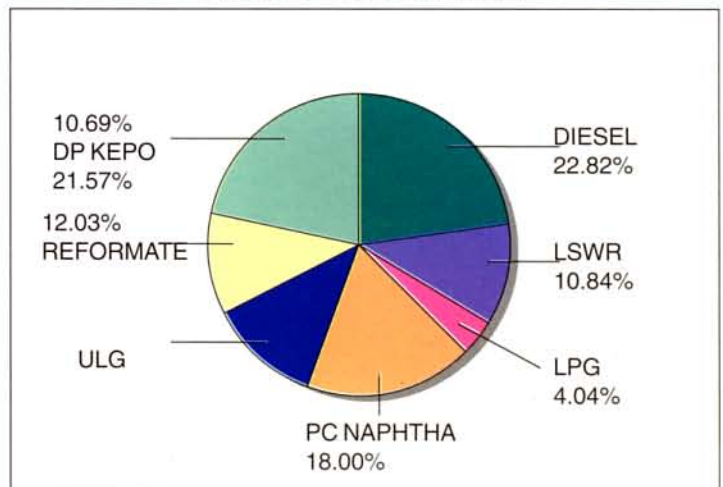
Table 2 - Designed feedstock in the sour train (stage 1)

Crudes	Volume anticipated (bpsd)	%
Sweet Crude Blend	29,000	29
Tapis (68%) Duri (32%)		
Iranian Light	4,500	4.5
Iranian Heavy	18,000	18
Basrah Light	4,500	4.5
FAO Blend	18,000	18
Arab Heavy	26,000	26

the lube basestock manufacturing facility under the second phase of the refinery comes onstream, the base oils will be piped directly.

The second phase of the Melaka refinery (sour train) has a processing capacity of 100,000 bpsd. Under the first stage of development, about 30% of local crudes will be used as feedstock with the balance from a range of Middle-East crudes (see table 2). Refined products will primarily be exported. The sour train is expected to process crudes from 1998 onwards.

Chart 2 Product Yields





*Marine facilities at the Melaka refinery.*

The MRC refinery will incorporate major process units such as the CDU, Vacuum Distillation Unit, Catalytic Reformer, Isomerisation, LPG/Naphtha/Kero Treaters, Distillate Hydrotreater, Delayed Coker, Sulphur Recovery and Gas Oil Hydrocracker.

The two refineries will have their own dedicated crude storage tanks and intermediate feedstock tanks. However, the finished product tanks and blending facilities will be shared. Other shared facilities are the utility systems, marine jetty and offsites like effluent treatment.

The marine facilities include a T-shaped jetty with dredge channel, two ocean berths (20,000-120,000 DWT), four coastal berths (2,000-10,000 DWT), one LPG berth and one marine craft berth. The berths are situated about 1.5km from the shore. Products for export are loaded via dedicated pipelines onto ships at Sg. Udang Port. For domestic sales, products are shipped via coastal vessels and by road tankers for inland distribution. Products to the Klang Valley and the new Kuala Lumpur International

Airport will later be transported by pipelines.

For environmental protection, the refinery complex is designed to reduce effluent discharge and emission. Two drainage systems made up of an oily sewage system and a surface water drain system have been installed. For oily water, the drains are connected to an effluent treating system where oil is separated from water and sent back to process units to be reprocessed. Oil-free water is then discharged to the sea. Surface runoff water goes to the surface drains and finally into two ponds where water goes into a stream and river. The quality of the water in both ponds are monitored on a monthly basis. There are 13 groundwater monitoring wells installed to monitor ground water quality.

For emission, a flare is installed with scrubber to minimise particulate and hazardous gas emission to the atmosphere. Air quality is monitored on a quarterly basis. A sludge farm with four plots to process sludge from the effluent treatment systems is also available. In addition, there are two

tanks to receive ballast water from ships.

In terms of fire protection, the PPMSB refinery is equipped with gas, heat, smoke and ultra violet detectors in the buildings as well as process areas to provide early warning. The main control room for process, storage and distribution are explosion proof and installed with very sensitive smoke detectors underneath the raised floor. All detectors are linked to the fire station and activate the alarm from there. The fire station is manned by 37 fire safety assistants employed and trained by PPMSB.

The many state-of-the-art independent and common facilities at the Melaka refinery will enable both PPMSB and MRC to achieve manufacturing and marketing synergies. More importantly, the refinery will provide Malaysia with additional refining capacity to ensure a secure supply of petroleum products as well as increase net inflow of foreign exchange by reducing imports and increasing exports of refined products.   
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