

1979-80

Second oil shock and 'car-less days'

Then, in 1979, the Ayatollah Khomeini seized power in Iran, which caused a second oil shock, pushing crude prices from around US\$13 to a high of US\$32/bbl. This caused an international oil shortage that resulted in "car-less days" in NZ and provided extra impetus for the expansion. Government became far more interested in energy development to help redress the balance of payments problem. This was a consequence of the oil shocks, but also partly due to the "take or pay" agreement the Government had signed with the Shell/BP/Todd consortium for the Maui gas. Eventually, in 1979, an expansion was approved the cost of which by now had risen to \$320 million. By March 1980, loans of US\$500 million had been secured from International banks, Shell had accepted the technical brief and Badger-Chiyoda had been approved as the major process plant contractor. However, due to the nature of the contractual agreement a final price had yet to be agreed. Also, the originally proposed catalytic cracker was being reviewed against a hydrocracker. The latter fitted in more closely with the total needs for NZ fuels and the aims of the "Think Big" projects, particularly the Taranaki Syngas plant that had been prompted by the Maui gas "take or pay" agreement.

The Refinery

The original refinery was built as a simple "hydroskimming" refinery, i.e. it had a crude distiller unit but very limited secondary upgrading processes. The crude distiller products consisted of naphtha, gasoil (diesel), and fuel oil. Naphtha was subsequently upgraded, in octane via a platformer unit to increase the octane. Sulphur in the gasoil fraction was reduced in a hydrodesulphuriser unit when processing sour feed in the crude distiller unit. The residue portion was used for either fuel oil or upgraded for bitumen manufacture. No kerosene or jet fuel was produced.

The expansion in the mid-1980's was based around a hydrocracker, a process that upgrades low value residues to high value finished components. The original choice of the catcracker configuration was based on NZ's perceived need for extra motor spirit. This need was now expected to be partly met by the synthetic gasoline (Syngas) plant at Motonui. Thus, the NZ energy profile had changed somewhat through the years of negotiation and the complex interrelationships caused by the "Think Big" approach. During this period, increases in air travel to NZ and an increase in domestic diesel demand had indicated a greater need for middle distillates (diesel and kerosene) than could be met by a catcracker configuration.

The hydrocracker unit itself requires further plant to supply feedstock:

- A hydrogen manufacturing unit to provide hydrogen gas for the hydrocracker,
- A high vacuum unit, to treat the crude distiller residue, and
- A butane deasphalting unit (BDU).

This latter unit is of particular interest as NZRC was the first hydrocracker to take feed from such a plant. Generally, the philosophy is to dig as deep in the barrel as possible (ie to process heavier feed and produce more high value products), to maximise the profitability of the refinery. However, dig too deep and the hydrocracker catalyst will coke up, which can be very expensive indeed. The BDU/hydrocracker configuration was unique, so the eyes of the oil world were on

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