CHAPTER - V

DEVELOPMENT OF THE OIL REFINING INDUSTRY

The oil refining industry is very young in India and developed mainly after the independence. At the commencement of the First Plan practically the entire demand of the country for petroleum products was met by imports as the output of the Digboi refinery, owned by the Assam Oil Company was little more than 5% of the total requirements. Soon after India attained independence, the Government of India took some interest in oil.

The History of Development

During the time of India’s independence international oil companies held a complete supremacy in the world outside the U.S.S.R. A minor proposal was made for setting up two or one refinery in India. There was still no oil policy and no oil department. At that time the Government believed that it would not be profitable for them to build a refinery as India consumed only 3 million tonnes of petroleum products in 1948.

The international oil companies behaved like super governments until the first blow came to them after the nationalisation of Oil Industry in Mexico in 1938 and of Oil industry in Iran in 1951. As a result the old world
scene underwent a marked change. The oil companies which had concentrated huge refineries at the producing centres decided to build refineries in consumption areas. They still had their empire of oil in other countries from where they could bring crude to the new refineries.

The Refinery Agreement was signed in 1951 under which both the Standard Vacuum and Burmah-Shell each agreed to build a refinery at Bombay. Standard Vacuum estimated the cost of the refinery with a capacity of 19 thousand barrels a day at Rs. 16.5 crores, but this capacity was raised to 25 thousand barrels a day five months later (Plate 4). Burmah-Shell estimated the cost in 1951, of the refinery, with a capacity of 1.5 million tonnes per year, at about Rs. 23 crores. The capacity of this refinery was also raised to 2 million tonnes per year in less than two months of the agreement.

Caltex joined with the other two international oil companies in 1953 and constructed a refinery at Vishakapatnam (Fig. 15). The initial capacity of the refinery was to refine 67 million tonnes of crude petroleum per annum. The cost of the project was expected to be Rs. 12.5 crores (Plate 5).
Plate - 4

The Bombay Refinery (HPC)
Plate - 5

The Vishakhapatnam Refinery
India's First Refinery

Oil refining being compared to new to India, the Government of India thought it desirable to explore the possibility of seeking technical and financial collaboration from any foreign country. As a result the Government of India concluded an agreement with the Government of the Rumanian People's Republic in 1958. Formerly the idea was to set up the refinery in Barauni in Bihar to feed the industrial belt of Bengal, Bihar and U.P., but later the Government decided to set up a small refinery in Assam and a bigger one at Barauni.

The work on the construction of the Guwahati Refinery started in the winter of 1959-60. The Rumanians set up a twenty-four months period for the completion of the refinery. Despite many difficulties in transporting equipments and materials from Calcutta Port to Guwahati by river and rail, the heavy monsoons in Assam and the inadequate local resources, it was possible to complete the refinery in schedule time. The refinery was inaugurated in 1962 with 750 thousand tonnes annual capacity.

Engineers from Indian and Rumanian worked side by side at the beginning. A self-contained township consisting of staff residences, medical centre, administrative office etc. was also built at an estimated cost of Rs. 1.70 crores.
The refinery consisted of the following process units at the time of its commissioning:

1. Crude distillation unit
2. Kerosene refining unit
3. Coke producing unit
4. Lead blending unit

The other auxiliary units were:

1. A thermal power plant
2. Fifty two storage tanks
3. A railway siding within the refinery
4. Effluent disposal system for the discharge into the Brahmaputra river.
5. A water supply scheme etc.

It was during this period from 1958 to 1960, our own efforts at discovering crude oil, refining and distributing started to take some shape. As oil production, with the discovery of new oil fields, started to grow in Assam and Gujarat, the idea of setting up of new Public Sector refineries got impetus. It was purely an economic question for us to have refineries of our own if we produce our own oil, at a cheaper rate.
The Second Refinery

The second refinery under the Public Sector was established in Barauni (Bihar), with 2 million tonnes per annum capacity in 1963. An agreement was concluded between the Government of India and that of U.S.S.R. in 1959. The refinery equipment came from Russia and the Indians were given training under Russian supervision.

The Barauni Refinery had a larger number of products in its production pattern. The main process units were as follows:

1. Two atmospheric and vacuum distillation units
2. Coking unit
3. Kerosene treating units
4. Bitumen unit
5. Lubricating oil plant

Provisions were made for fifteen days storage of crude oil and thirty days storage of finished products. Other auxiliary installations were similar to that of the Guwahati refinery. The discharge of the refinery were designed to be pumped into the Ganga river. The investment cost of the Barauni refinery along with the township was estimated at ₹40.70 crores.
The Third Refinery

The discovery of new fields in Gujarat state, enabled the Indian Government to construct a third refinery at Koyali in Gujarat (Fig. 16). The refinery is situated at a distance of 12 km. north of the city of Baroda. The refinery had a capacity of 2 million tonnes per annum. To cater to the industrially developed hinterland of the refinery, it had a varied nature of the product mix, with more processing units than the other two.

The river Mahi and its tributary Meni were utilised for the discharge of the refinery. A broad guage railway line along with the National Highway No. 8 connects the place with Bombay-Ahmedabad and Delhi.

The Fourth and Fifth Refinery

Two other refineries were established in the east and west of the country in Madras and Cochin respectively. The Madras refinery went on stream in 1969-70 with a capacity of 2.80 million tonnes. The refinery at Cochin had a capacity of 2.5 million tonnes and started production in 1966. The Cochin and Madras refineries are owned by two joint sector companies, Cochin Refineries Limited and Madras Refineries Limited respectively.
Cochin Refineries Limited (CRL) was incorporated in September 1963. Madras Refineries Limited (MRL) was incorporated as a company in December 1975 with an authorised capital of ₹ 13.50 crore, pursuant to the agreement between the Government of India, National Iranian Oil Company and AMOCO India, Inc. of USA. (Plate 6).

The Refineries after The Arab-Israel War

After the War the country faced the most devastating petroleum crisis of the country due to a sudden sharp rise of petroleum prices in the world market by the OPEC countries. Indian economy was passing through a transition from traditional economy to semi-industrial one and at this stage sharp rise in the oil prices of early seventies made everything upset. As a result more attention was given to lessen the oil import bill. The only solution of the problem was to establish more refineries and to increase the capacity of the existing refineries and 1973 is supposed to be a great divide in the petroleum refining industry of our country.

Under this condition a refinery was commissioned at Haldia in 1975 (Plate 7) mainly to cater to the demand of the Hooghly Industrial Complex and the adjoining areas of Orissa. The 2.5 million tonnes Haldia refinery was to have been completed by 1972 but the delay was due to unexpected
Plate - 6
Crude Oil storage tanks at Cochin Harbour
Plate - 7

The Haldia Refinery
problems of soil conditions, industrial unrest, delays in indigenous equipment delivery and absence of unified project management (Fig. 17).

With increase in the crude oil production of Assam region, a refinery was set up at Bongaigaon. The place being well connected by all the major cities of Assam as well as that of West Bengal and Bihar and having access to the longest crude pipeline of the country, was an obvious choice for the establishment of a refinery. This refinery started production in 1980 with a capacity of 1 million tonnes per annum.

The last Indian refinery to be commissioned was at Mathura (U.P.) during 1981-82 (Fig. 18). The refinery was set up to meet the growing demand of petroleum products of the north west region. The principal considerations that have prompted this decision were, Mathura's central location within the demand area, proximity of both broad gauge and metre gauge railway lines and National Highway and availability of land. The Mathura Refinery was the largest in India with a capacity of 6 million tonnes at the time of its commissioning. But later on with the revamping of the Koyali Refinery, this refinery has now become the second largest refinery of the country.
Fig: 17

HALDIA REFINERY

DURGACHAK

PROPOSED PETROCHEMICAL COMPLEX

HALDIA R.S.

DOCK AREA

REFINERY (I.D.C.)

RIVER HOOGHLY
The refinery process units include:

1. LFG treating plant
2. Naptha treating plant
3. Kerosene treating plant
4. Fluid catalytic cracking unit
5. Sulphur recovery unit
6. Bitumen unit etc.

The treated waste water is discharged into the Yamuna river.

At the end of the Seventh Five Years Plan India had twelve refineries. At the moment, there are proposals for building three grassroot refineries, one with a capacity of 6 million tonnes at Karnal, another at Mangalore of 3 million tonnes capacity and the third in Assam under the Assam accord with 2 million tonnes capacity. Tata Chemicals will be the private sector Co-promoter with Indian Oil Corporation for the Karnal Refinery which is expected to cost ₹ 1,800 crores. The Mangalore refinery, a Joint venture of Hindustan Petroleum Corporation and Indian Rayon Industries Limited will cost ₹ 1,540 crores.

The Refinery Ownerships

There are three companies employed in the refining of oil in the country now. They are Hindusthan Petroleum
Corporation (HPC), Bharat Petroleum Corporation Limited (BPCL) and Indian Oil Corporation (IOC). All these are under Public Sector. HPC owns the Vishakhapatnam and the Bombay refinery which was under ESSCO Company. BPCL owns the Bombay refinery which was under the ownership of the Burmah-Shell Company. IOC is the largest oil refining company of the country which owns the other 7 refineries including the Digboi refinery which was under Private Sector (Assam Oil Company) till 1981.

The Burmah Shall Refinery at Bombay was taken over by the Government in January 1976 and the ESSO refinery at Bombay was taken over by the Government in March 1974 and the Caltex Refinery at Vishakhapatnam merged with HPCL from March 1978.

In addition to these there are two Public Sector Companies (each with a minority foreign collaboration), Cochin Refinery Limited (CRL) and Madras Refinery Limited (MRL)

**Crude Supplies to the Refineries**

The type of crude oil, used in a refinery would depend on considerations such as availability of indigenous crude oil in the region, prices and availability of imported crude and the product pattern of demand for oil products in
the region. Since indigenous crude oil is available in
the Assam and Gujarat region of the country most of the
crude oil of these regions has been considered for the
refineries located in these regions. Assam crude oil
(Naharkatiya, Moran, Lakwa and Rudrasagar) have been con­sidered for the inland refineries like Harauuni, Guwahati,
Bongaigaon and Digboi. Similarly Gajarat crude (Ankleshwar,
Kalol etc.) for Keyali, Bombay and Mathura refinery.

With the sudden increase in the international crude
oil prices in the early seventies, indigenous exploration
work were given priority. The discovery of the Bombay High
oil field in the later half of the seventies changed the
crude oil utilisation pattern. The indigenous crude oil
production rose very rapidly after this discovery, and many
coastal refineries like those of Vishakhapatnam, Cochin,
Madras started to utilise Bombay High crude.

The choice of imported crude oil for coastal as well
as inland refineries depends on (1) availability of the
Indian share in Rostam Crude oil (2) availability of crude
oils from Iraq, Kuwait or Saudi Arabia, under bilateral
agreements, (3) The linkage of some refineries with speci­fic types of sources of crude oil and (4) the design of
some of the refineries to suit specific crude oil.
The first two imported crude oil based coastal refineries at Bombay and Vishakhapatnam were based on the crude from the Middle East in the case of Bombay and Indonesia in the case of Vishakhapatnam. The later period coastal refineries at Cochin, Madras and Haldia utilised imported crude from Arab countries and the Middle East. The freedom to choose the source of supply of crude oils given to oil companies in the refinery agreement restricts the types of crude oil that could be considered for these coastal refineries. It is found in the case of the Madras refinery where the mentioned product mix is only possible with the utilisation of Darius oil (Fig. 19).

By the end of the Seventh Plan all the coastal refineries except Haldia, is utilising heavy Bombay High crude after the secondary processing units have opened up in the existing refineries. The following is the percentage of Bombay High crude utilisation of the coastal refineries:

- Vishakhapatnam : 75%
- Madras : 50%
- Cochin : 70%
- Bombay (HPCL) : 30%
- Bombay (BPCL) : 20%

The inland refineries like Koyali and Mathura are
now using Bombay High crude. The Mathura refinery is utilizing low sulphur content Middle East crude also.

It may be noted that Ankleshwar crude is the lightest crude with 24.1% yield of naptha, 50.7% yield of middle distillates and 21.7% of residual fuel oil compared to this other indigenous crude oils are heavier crudes giving lower yield of naptha and middle distillates.

**Conclusion**

Hence with a meagre start during the first plan period, Indian oil refining industry has now been in a quite satisfactory position with twelve refineries on the production line. But still the industry has a long way to go with the ever increasing product imbalance in the oil sector and a large import bill—destabilising the economic growth of the country.
References


