

Letter from Punjab**Beas-Sutlej Power Complex**

PUNJAB is threatened with acute power shortage once again. The current flow in the Sutlej is so poor that it is feared that if the Bhakra reservoir is not replenished in time, its water level may soon fall below the penstock gates. This will put the newly-commissioned unit of the Left Bank Power House out of action. A cut in power consumption of 10 per cent has, therefore, been imposed from mid-December. It is against this background of additional power load continually outpacing additional power supply that the proposed Beas Scheme has to be viewed.

The Beas project will consist of two units. The first of these, the Beas-Sutlej Link envisages the construction of a darn at Pandoh in Kulu Valley to divert the waters of the river Beas to the Bhakra reservoir through tunnels and open conduits. The 'link' will consist of the 5-mile Pandoh-Suketi tunnel, the 14-mile Suketi Valley hydel channel and, finally, the 9-mile Suketi-Dehar tunnel. It will have a natural fall of 1,000 feet at Debar where a power plant will be installed. The minimum flow through the 'link' will be 7,500 cusecs. except during the dry months when it will be 1,800 cusecs. The power plant at Dehar will supply about 600 mW of firm power. Further, the construction of Mink' will ease pressure on the Gobind Sagar and therefore, make possible additional power generation at Bharka and extension of irrigation facilities to Southern Punjab.

**Long-term Project**

Preliminary work on this part of the Beas Scheme was scheduled to begin in 1960-61 with an allocation of Rs 50 lakhs. Out of the total cost of Rs 80 crores, Rs 13.5 crores (including Rs 7 crores in foreign exchange) will be incurred during the third Plan.

The second part of the Beas project will cover a 325-foot high earth and rock fill dam at Pong in Kangra District with a 'live' storage capacity of 5.55 million acre-feet and a power house with a capacity of 122 mW of firm power at 100 per cent load factor. Water stored in the dam will be released to the Rajasthan Canal and the Sirhind

Feeder during the winter months. Construction of the dam will be undertaken jointly by Rajasthan and Punjab and its irrigation benefits will accrue mainly to the former while Punjab will benefit chiefly from the new power generated. A detailed project report for this unit has been prepared and the total cost is estimated at Rs 87 crores of which Rajasthan will meet about Rs. 70 crores. A sum of Rs 60 lakhs is expected to be spent during 1960-61 on preliminary work. The third Plan includes an allocation of Rs 10.1 crores, including Rs 12.38 crores in foreign exchange for this part of the project. It must be noted, however, that though the third Plan contains a sizeable allocation for both units of the project, no benefits are likely to accrue during this period.

**Power from Bhakra**

The overall feasibility of the two-unit Beas project has been established. But in view of the fact that the Pong Dam lies in a seismic area, the axis on which its foundations will rest remains to be ascertained. For this purpose a tunnel is proposed to be dug below the river bed at Pong. The General Manager of the Bhakra project has been given charge of the Beas project and so the transfer of men and equipment from Bhakra to the new sites will be facilitated. The control and supervision of the Beas project is likely to be entrusted to an autonomous board with representatives of the Central Government and the two State Governments associated with the project. The United States and the World Bank have offered \$33 million and \$23 million respectively as loans to meet the foreign exchange costs of the project.

The Beas project will in due course be dovetailed to the Bhakra system to become one of the largest power systems in the world. The Bhakra system itself is made up of two units—the Bhakra Dam proper and the power stations on the Nangal Hydel channel at Kotla and Ganguwal which have an installed capacity of 48 mW each. An additional unit with a capacity of 20 mW

is being installed at both Kotla and Ganguwal. These units will be ready by March and June 1961 respectively.

But the much bigger power generating units are at Bhakra. The Left Bank Power House, the first unit of which was commissioned in November last, will have five generating units of 53 to 100 mW capacity each, depending on the water level in the reservoir. All these units are expected to be commissioned during 1961. Only four of them, however, will work at a time and so the firm power capacity of the Power House will be 212 mW in all.

The Right Bank Power House of the Bhakra Project is estimated to cost Rs. 26.43 crores of which Punjab will contribute about Rs 21 crores. During the third Plan a total of Rs. 21.11 crores will be spent on it, with Punjab contributing 18.71 crores. With the construction of this Power House, the total cost of the Bhakra-Nangal Project will come to Rs 196.43 crores of which Rs 96.66 crores will be accounted for by power schemes. Initially four units of 70 to 120 mW capacity each will be installed and a fifth will be added later when the Beas-Sutlej 'link' is completed.

**Thermal and Diesel Units**

The entire power complex can, however, be put out of gear if rainfall is inadequate or late. Except when rainfall is so poor that the water level in the reservoir falls below the penstocks, the working head available at Bhakra will vary from 268 feet in May-June to 512 feet immediately after the monsoons in October. Now, the same quantity of water can generate more power if released from a higher head than from a lower head or, conversely, to generate a given quantity of power more water has to be released from a lower head than from a higher one. Water level being high during October-November less water will have to be released to generate power. During this period, however, more water has to be released for Rabi sowing and so the advantage of the high water level for power generation may not be fully realised in practice.

Apart from this difficulty, which is characteristic of all Bhakra-type multi-purpose projects in India, there is the further uncertainty about rainfall. However, it is proposed to firm up Bhakra hydro-power with thermal and diesel sets. A nucleus one-unit scheme with a capacity of 50 mW is to be initiated near Delhi. Small diesel stations with capacity up to 25 mW will be set up at various load centres like Chandigarh, Sangrur, etc at a total cost of Rs 2 crores.

#### Seasonal Load

Variation in water level introduces the problem of developing adequate seasonal power load. Since, as mentioned above, water level in the Bhakra reservoir will vary from about 270 feet in May-June to about 510 feet in October, generation of secondary power above the firm capacity will be possible only for 6 to 8 months from October. Seasonal industries must, therefore, be started to consume this secondary power which will not be available all through the year. Cane crushing, cotton ginning, and processing of agricultural produce in general are some such industries.

Load centres in Punjab are growing rapidly. Besides, Delhi which now consumes for 60 mW of Bhakra power, will take away another 40 mW of the power generated by the Right Bank Power House. At the same time all towns with a population of 10,000 and over have been electrified. Finally, of the 20,000 villages in Punjab, 3,000 are to be electrified by the end of the second Plan and another 3,000 during the third Plan. As against this rapid growth in load, targets of increase in power generation are as follows:

	Installed	Firm
	(in mW)	
First Plan	96	84
Second Plan	652	373
Third Plan	1229	680

The present power shortage may not be relieved till mid-1961 when the new units at Kotla and Ganguwal are commissioned. Even this addition to capacity is likely to be soon outstripped by increase in load. Ultimately, Punjab can expect to have a sound power base only when the Right Bank Power House is commissioned by 1964-65. The Beas Scheme, as mentioned above, is a long-term project. In the meantime, extension of the old Uhl River (Jogindernagar) Scheme, exploita-

tion of the power potential of the water falls in Upper Bari Doab and Western Jamuna Canals and the installation of thermal and diesel sets, discussed above, are expected to alleviate the power shortage in the State.

#### Copper Ore Production

THE production of copper ore during January-October, 1960

was 369,072 metric tons, according to the Indian Bureau of Mines. This represents an increase of about 9 per cent as compared to the output of 338,512 metric tons in the corresponding period of the preceding year. The entire production was reported from Singhbhum district of Bihar State.