Heavy water shortage faces India

from Narender K. Sehgal

IN less than two years' time, India is likely to find her heavy water requirements exceeding availability. So, what's new? Nothing except that, unlike other items, heavy water is a 'nuclear' material and its import from abroad may involve more than mere commercial considerations. (Heavy water is used as moderator and coolant in the Indian nuclear reactors.) In the wake of recent developments following India's explosion of a nuclear device, nuclear powers such as the United States, the Soviet Union and the United Kingdom along with Australia, Canada and West Germany are reported to have decided that no vital 'nuclear' materials shall henceforth be supplied to non-nuclear weapon countries unless they are subject to International Atomic Energy Agency (IAEA) safeguards under an agreement. It is not yet clear whether or not this implies that these countries will refuse to sell heavy water to India. The IAEA meeting at Vienna recently did not provide a clear cut answer.

Work is now in progress in India on three nuclear power projects, one each in Rajasthan, Tamilnadu and Uttar Pradesh. (One of the units of the Rajasthan project is already delivering power. At present, India has a small heavy water plant (14 tonnes annual capacity) at Nangal in Punjab. But four more plants with a total annual capacity of some 300 t are under construction at Kota (Rajasthan), Baroda (Gujarat), Talcher (Orissa) and Tuticorin (Tamilnadu). The production will reach maximum capacity in stages and only by 1978 will it near the 300 t mark—that is, if work goes on as planned.

According to Atomic Energy Commission calculations, India will have to find something like 200 t of heavy water from outside sources during 1976–77 and then again during 1981–83 when shortfalls will occur if no additional production capacity is installed.

In theory, design specifications provide 100% leak-proof heavy-water systems in reactors and after the initial loading (which means more than 200 t of heavy water for each of the reactors under construction in India) no more should be required. But in practice leaks invariably do occur during operation and arrangements are always made to recover the leaked fluid and upgrade it for reuse. However, some replenishing is always needed to make up for losses during the recovery process.

India is reportedly already negotiating with several countries in this con-

nection. If the countries mentioned above choose to enforce their decision, France may be the only alternative left. Then again, the question will hinge on whether or not France will be able to spare the amounts of heavy water required by India, after her own needs are taken care of. If it does not become possible to arrange the needed quantities of heavy water, the already bad power situation will worsen further as the nuclear power projects will either face delays or curtailments in power generation, or both—a price India may have to pay for her two 'sins': conducting a nuclear explosion and refusal to sign the nuclear non-proliferation treaty! □

Conservation golden jubilee

from Vera Rich, London

NOVEMBER 29, 1974 marked the golden jubilee of the All-Russian Society for Nature Conservation, an organisation which has grown over the years to a membership of some 26 million, and which has as its chairman no less a personage than the Deputy Minister of Land Reclamation and Water Economy of the Russian SFSR, N. G. Ovsyanikov. Accordingly, in addition to the official notice of the anniversary, which reported such diverse activities as reforestation, the protection of beavers, the study of the ecological effects of damming rivers, and the propagation of the correct Leninist attitudes to nature, *Pravda* has also carried a number of other news items slanted towards conservation interests.

Thus, on November 20, the "temporary rules" for the conservation of Lake Baikal were announced. These rules, confirmed by the Ministry of Land Reclamation and Water Economy after a long and careful study are aimed primarily at preserving the water resources of the lake. In addition to the purification measures already introduced for industrial plant (especially paper and timber mills) on the tributary rivers, the new rules envisage the maintenance of the rivers themselves. All submerged timber is to be removed from the river beds, and the rafting of timber down these rivers is to be stopped entirely. The transportation of timber by means of "water-stable floats" is to be extended. All waters of the Baikal basin and of the lake itself are to be protected from physico-chemical and biological pollution of all kinds—and, by means of careful organisation and control of holiday centres, sanatoria and rest-homes, from tourist pollution as well. And, in accordance with the Siberian proverb "While there's

forest, there's Baikal", all forestry operations in the area will be carefully monitored to obviate erosion and drying out of the soil, with, in particular, a total prohibition on all tree-felling on slopes with a gradient exceeding 15°.

Again on the subject of forestry resources, a report from Kiev (*Pravda*, November 21, 1974) notes that in the rice-growing areas in the south of the Ukrainian SSR more than 250,000 tonnes of rice straw go to waste each year. In the very same region, there are two paper and cellulose combines which every year consume up to 300,000 cubic metres of timber, brought from the Arkhangel'sk region on the White Sea. If the rice straw, already on the spot, could be used instead of timber, not only would it conserve several thousand hectares of forestland per year, but would also save the cost and logistics of shipping the timber from the extreme north to the extreme south of the USSR.

The "conservation" of human ecology from natural disasters is also well represented: on November 24, a report on measures against erosion by wind and water in the Caucasus, and Transcaucasia, Kazakhstan, the Urals and Eastern Siberia; on November 27, a report from a hydrotechnical research expedition to the Amu-Dar'ya, the "most capricious" of Soviet rivers, where there is a unique problem of bank erosion, locally known as the Deigish, which can lead to extensive flooding, with destruction of hydrotechnical installations, fields and plantations.

And from Vladivostok, in the interests both of conservation and ecology, an interview with Vladimir G. Osipov, Head of the Sector of Oceanic Pelagic Fish of the Pacific Scientific Research Institute of Fisheries and Oceanography, explains the current interest of his Institute in sharks. Not only are they of interest to the ocean ecologist, standing as they do at the apex of the "food pyramid", and to the palaeoichthyologist—they also represent for mankind "a considerable reserve of protein". Shark's liver is rich in vitamins, and the medical industry has been interested for a long time.

Unfortunately, there remains the hazard to life and limb of those deputed to study and catch sharks. Although shark-repellent substances, electrified barriers, or, "most promising", special nets, can be used to protect bathing beaches, it is clearly impossible to study sharks at long range, and "scientists have recorded a large number of tragedies" while working in this field. Like many ecological and conservation problems, shark harvesting seems a matter of theoretical promise but great practical difficulty. □