

# public acceptance: a japanese view

The following article has been contributed by Dr. Tamaki Ipponmatsu, of the Japan Atomic Power Company.

Three factors enter into a consideration of the public acceptance of nuclear power — the public, nuclear power as an entity, and the interaction between the two. 'Interaction' here implies the manner in which nuclear power is presented to the public — what is the public need for nuclear power, and what public risk is entailed in having it? The problem of public acceptance, in this sense, is time-dependent. For the public is changeable, just as nuclear power is subject to technical progress and 'social' improvement.

Several outstanding factors must be considered in the case of Japan. It may be well to enumerate them, in order to understand how it is that the 'public acceptance' issue is particularly conspicuous in my country. The problem has in fact been acute from the very beginning of the nuclear age. As I had rôles to play during the initial phase of nuclear power plant construction and operation in Japan, public hesitation and non-acceptance form an important part of my memories associated with the Tokai Mura Nuclear Power Station. Today public acceptance is becoming a world-wide issue; and it is probably appropriate now to recollect, re-evaluate and analyse this problem further.

The outstanding factors I referred to earlier are as follows. First, Japan is geographically a very small country with a very high density of population. Any industrial activity and any large-scale employment of modern technology is apt to have a much greater impact on the physical, social and biological environment of individual Japanese people than similar activities would have on those of other countries. Industrial pollutants such as sulphur dioxide from power plants, oxides of nitrogen from automobile engine exhausts, organic mercury from chemical industries and so on affect society to a high degree, considered in terms of their concentration either per capita or per square kilometre. In the case of nuclear power, therefore, people are more concerned with radiological effects than with thermal pollution.

Secondly, Japan has had a very high growth rate in her industrial activities. Coupled with the first point mentioned above, this implies an accelerated increase in environmental problems if no specific actions are taken to reduce pollution. At the same time it implies that demand for electrical power is increasing very rapidly: if an annual growth rate of more than 10 per cent continues Japanese utilities will have to keep building power stations and burning more and more fuel. Japan has to import most conventional fuels such as oil and liquid gas from abroad. Only limited supplies of low-sulphur content oil are available; there is a limit to the amount of oil which may be transported, set by the possibility of ocean contamination by oil spills; and the handling, storage and refining of huge amounts of oil is another serious problem area. Other things being equal, Japan's future reliance on nuclear power will be much greater than that of any other country.

Thirdly, no matter how one looks at it, the experience of Hiroshima and Nagasaki has made the average member of the Japanese public very sensitive to the problem of radiation safety. This is no longer a subject in which science or logic can persuade. In a sense, psychologists may term this the field of a national reaction pattern. I should not over-emphasize this aspect, because it is not really that bad — but at the same time I cannot over-emphasize this national trait. It is not that easy, either.

Back in 1958, when the Japan Atomic Power Company was trying to import the first 'commercial' -sized nuclear power station from the United Kingdom and build it in Tokai Mura we ran into a public reaction pattern in full blast. (This was a Magnox-type 166 MW(e) station. One may smile at the idea that 166 MW(e) was a very large and 'commercial' size then. In today's terminology 'commercial' implies a station size of at least 1000 MW(e). I shall return to this point later.)

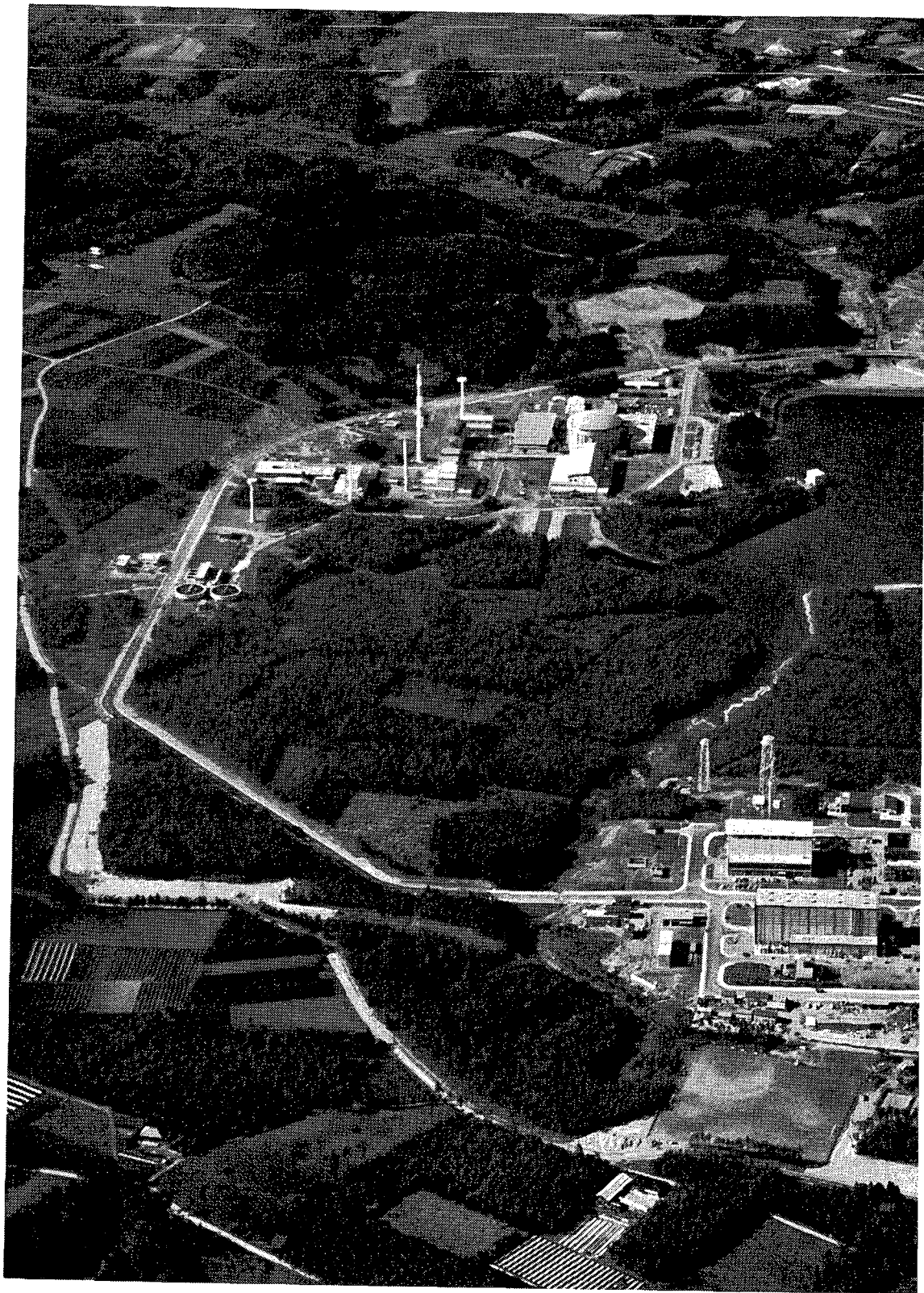
The project was greeted by the public with very mixed feelings. The public wanted to regard nuclear power as the herald of a brave new age of modern science and technology; yet it was afraid that this radioactive mammoth might reproduce Hiroshima and Nagasaki in some unpredictable way. The technology of nuclear power generation throughout the world was very young, and not many people could give definitive explanations to answer many of the problems raised.

In addition to the public education and enlightenment programme which was carried out in order to explain the future rôle of nuclear power in human society, I remember that we pledged to take up individual technical problems and to offer satisfactory technical answers to each of them. Just to cite some examples of the problems which were publicly discussed, I will mention the following: the aseismic design of graphite piles which constituted the reactor core (moderator and reflector); Wigner energy accumulation in graphite, and its release mechanism; and the positive temperature coefficient of reactivity, which made the problem of control very complicated.

Experiments and tests were conducted, and experts of world renown from both Japan and the UK were invited to talk to the public and to the licensing authority. Many public hearings were conducted, and often we found such highly technical problems discussed in the National Diet. The Japan Atomic Power Company was also willing to accommodate many design changes whenever proper conservatism was called for, and this at considerable additional cost. By the time construction of the plant reached mid-way, the public had fully accepted the Tokai Mura Nuclear Power Station.

Many legal and administrative mechanisms for dealing with nuclear power were established as the Tokai Mura project went on its way. These included procedures for safety evaluation, and nuclear liability (in respect of third parties) and insurance.

At about the same time, in 1957, the Kansai Research Reactor project ran into definite public 'non-acceptance'. This was a project for a small swimming-pool reactor which universities in the Kansai area wanted to operate jointly, and there was a certain lack of



An aerial view of the O-arai Engineering Centre, Japan.



confidence with respect to problems which inhabitants of the proposed site area felt were not finally resolved. It took five years before working compromises could eventually be worked out at an acceptable site.

Fall-out from repeated atmospheric weapons testing, as well as reports of careless mishandling of radioisotopes at hospitals and so on confused the issue as well. It cannot be denied that frivolous journalism, in the day-to-day handling of news, treated such issues as problems equivalent with those of reactor safety.

Circumstances were very different by the time we began a new project for the building of a 357 MW(e) boiling-water reactor on the Tsuruga Peninsula. By 1966 people throughout the world were beginning to appreciate the great potential of nuclear power much better, and as a more real issue. As a result of our experiences at Tokai we were already in possession of mechanisms to enable the public to participate in environmental monitoring of radiation.

The income to local authorities resulting from a property tax on an expensive nuclear power station was also a not negligible attraction. People understood better that progress in the design of engineered safety features and so on had made incidents such as those described in documents such as WASH-740 unrealistic. These factors combined to enable us to choose between a number of possible sites. In some cases local inhabitants expressed strong willingness and their desire that plant construction work should be convenient.

Several other utilities who began work on nuclear power plants at about this time felt the same way with respect to their sites throughout Japan.

There is a problem of siting that is peculiar to Japan: that is, compensation for fishing rights. Most power stations in Japan are built along the coast for access to condenser cooling water; this is true regardless of whether the station concerned is conventional or nuclear. This implies that a certain section of the coastal fishing may be affected, and fishermen are customarily compensated. This usually involves delicate negotiation, but in substance it is a problem common to both types of station.

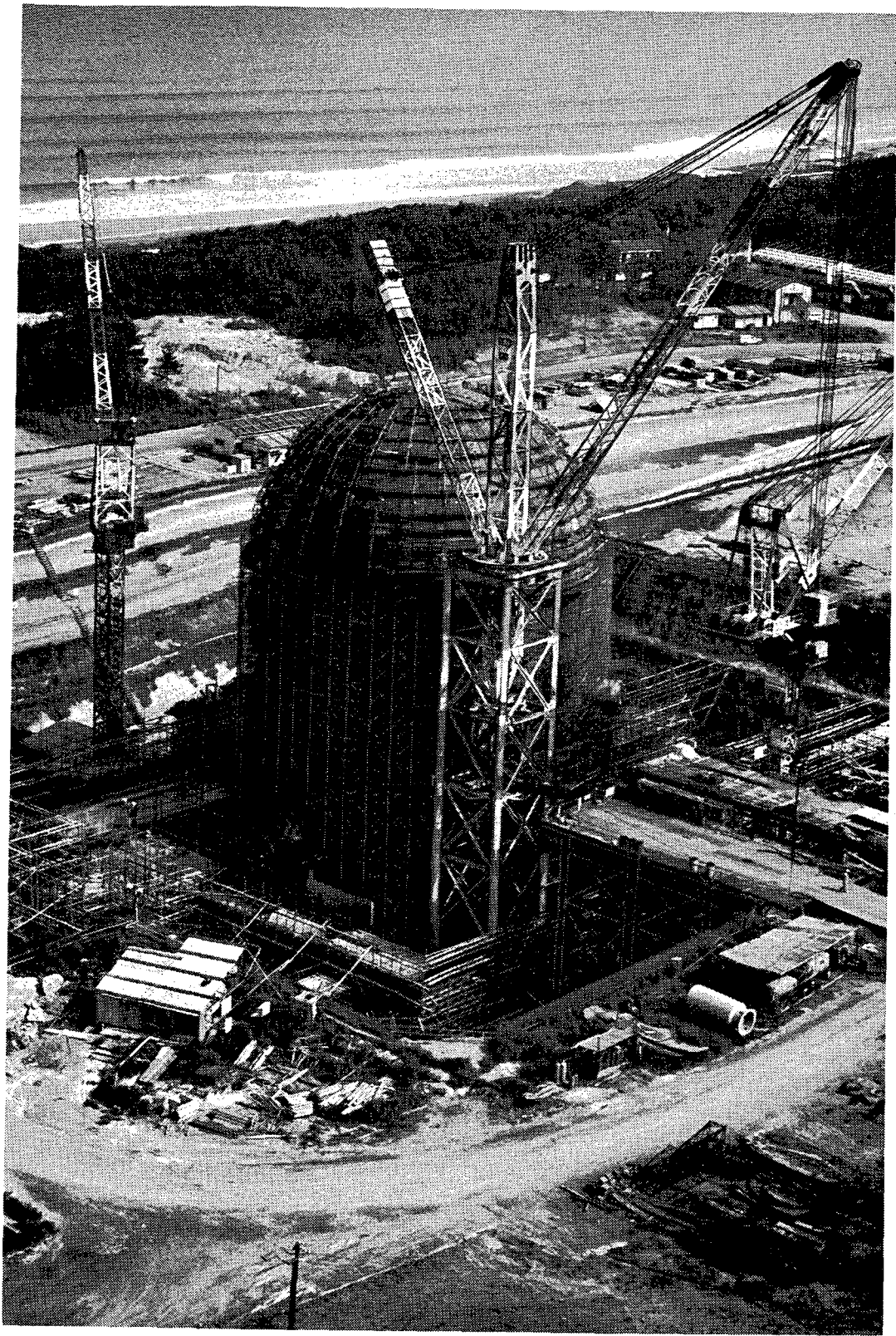
The 1970s have seen already increased public concern with respect to environmental pollution. Japan is no exception in this respect. In fact, as I have attempted to point out, the concern is if anything stronger and more immediate in Japan. In such an atmosphere, and against the known psychological background to public attitudes with respect to radiation and its effects, one cannot deny that public reaction to nuclear power contains always a considerable element of the irrational and emotional.

It is also time, however, that we examined nuclear power itself in somewhat more detail, in order to assure ourselves that it is worth acceptance from the point of view of the public. First, are we really justified in promoting bigger and bigger nuclear power stations? Have we not gone slightly too fast in promoting larger units with ever higher power densities merely in the name of economics? Has there been enough consideration paid, and enough money spent, to identify genuine safety problems and environmental problems, and to offer adequate technical and engineering solutions to them? I do not say that we have been wrong. But it is well that we should spend time now to and really think about such problems.

Similarly, with regard to the problems of long-term waste management and the effects of low levels of radiation on our health. It may be inevitable that a certain amount of confusion exists today in many countries about public acceptance. Often such confusion affects the processes of site selection and of initial safety assessment; certainly, Japan is having her fair share of the problems.

The way to meet the challenge is, again, by dealing with individual technical problems by competent technical means. We should not leave technical and design problems or problems





of social cost versus optimization of benefit to the public relations man alone. In Japanese industry, we are going to promote research into reactor safety even more seriously. To supplement available funds the Japanese Government is allocating a larger share of the budget in this area. We have also started a Fish Farm Experiment, using discharge water from the Tokai Station. An increasing number of nuclear power stations are entering into arrangements for public participation in environmental radiation monitoring.

Looking back to the 1950s, one can see that the public acceptance of nuclear power in Japan has passed through a number of stages. Today we believe, as I always have, that the way to win the public's acceptance of 60 000 MW(e) of nuclear power generation in Japan by 1985 is by taking up individual problems on their merits — not by trying to avoid them.

