

stockholm: the promise of nuclear power

Demand for electricity in industrialized countries is doubling every ten years; by the end of the century an additional 1000 MW(e) power station may be needed almost every day.

With this in mind Dr. Sigvard Eklund, Director General of the IAEA, addressed delegates to the United Nations Conference on the Human Environment, held in Stockholm in June.

He took as his general theme 'reconciling energy demands and environmental concerns'.

Energy consumption is increasing at rates which make the time we are living in a turning-point in the history of mankind's use of energy sources (he said). With growing populations and the industrialization of the developing world ever more energy will be required to satisfy basic needs and to attain improved standards of human welfare. One must recall that energy is a pre-requisite to the elimination, as far as possible, of the impact on the environment caused by this growing industrialization — for instance, for the recycling of material and the purification of water.

This growth in energy consumption, over the long-term, will strain our natural resources of fossil fuels. In order to conserve them for future generations, then, some additional source of energy must be found; otherwise industrialization, with its energy requirements, will represent only a very short period in the history of mankind.

Nuclear energy today provides only two per cent of the world's electricity; by the year 2000 this fraction is expected to increase to 50 per cent. It is therefore timely to consider now the environmental advantages and disadvantages of nuclear power production, to prepare for the future when the problems will be of another magnitude.

Because of the hazardous nature of the fuel used, the nuclear industry was compelled, from the beginning, to carefully control and limit its emissions to the environment. This sets it apart from other industries, which have been releasing noxious elements to the environment for decades, and on which we are now trying to impose controls when we are faced with intolerable consequences. Routine releases of radioactivity from nuclear reactors are so low

that it is difficult, if not impossible, to measure any increases in the level of radiation exposure in their vicinity. Even assuming a 100-fold increase in the production of electricity by nuclear plants, which will occur only in the next century, the average radiation dose would still be only about one per cent of the natural background radiation. I often wonder if those critics who object to any increase in the natural background radiation would be willing to abstain completely from air travel, during which the exposure rates are many times higher than when travelling by means of surface transportation.

The avoidance of potential damage

The low-level releases of radioactivity associated with the normal operations of a power plant and ancillary facilities should be taken as an example of how potential environmental damage can be avoided – that is, by setting standards, issuing regulations, and then monitoring the surrounding area to ensure their enforcement.

To the 'problem' category belongs the management of radioactive wastes from reprocessing plants, particularly high-level wastes which must be isolated from the environment for periods much longer than stable governments have existed in the past. Storage in contained forms in stable geological structures well below ground waters seems to offer a long-term solution to this problem, which will become more important in the future. The disposal of low-activity wastes into rivers and the seas is an example of an environmental question in relation to which internationally acceptable standards must be defined.

I do not pretend for a moment that we already have, now, long-term solutions for all of these problems; satisfactory solutions exist, however, for the next decade, and there are good prospects that nuclear technology will develop to meet the requirements when needed, as has been the case with almost all other technologies in the past.

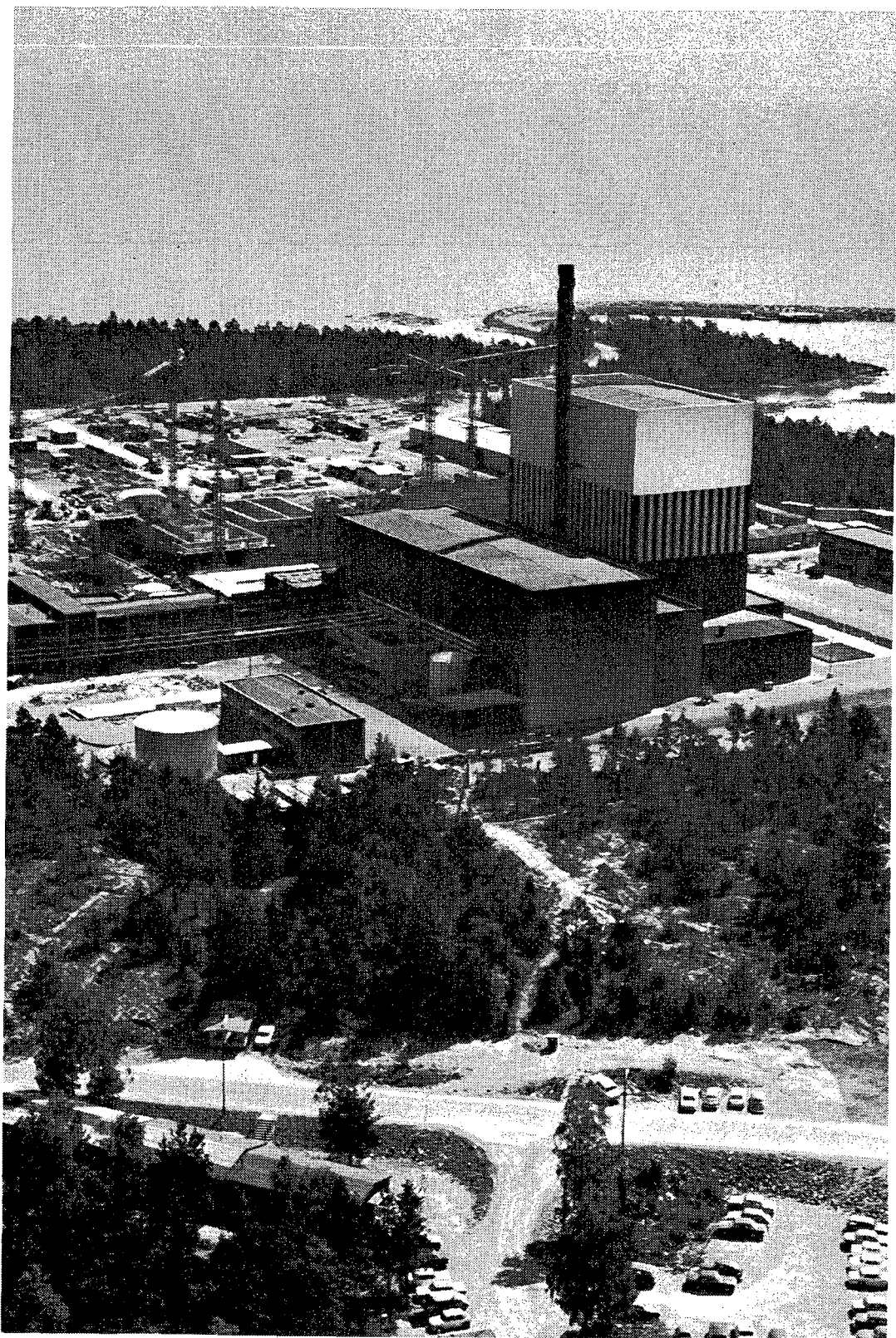
Another problem that must be faced in the future, as nuclear power production increases, is the build-up of plutonium in inventory and the growing amounts of nuclear fuel in transport. This material must be protected both from accidents, and against diversion to non-peaceful uses. The IAEA has established very stringent regulations for safe transport, which are already in force internationally.

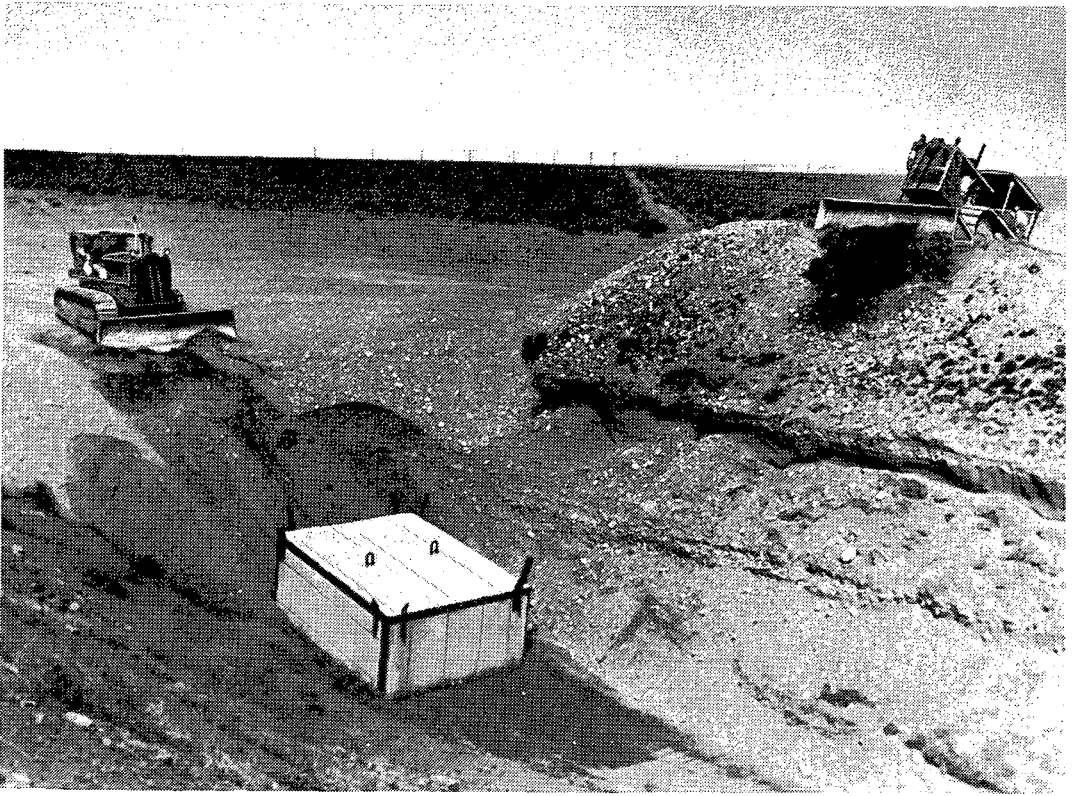
As for the safety of nuclear power, in more than 700 reactor years of operating experience, there has not been a single serious accident at a commercial power plant. To date no member of the general public has been over-exposed to radiation as a result of the few incidents that have occurred at reactor facilities.

Space does not permit me to comment on thermal pollution, but it may suffice to say that in all these areas – radiation protection, waste management, nuclear safety and thermal pollution – the IAEA is engaged in activities the ultimate aim of which is to foster the safe use of nuclear power in meeting the world's growing energy requirements.

The Agency prepares, and up-dates, jointly with the World Health Organization, basic standards for radiation protection that are based on the recommendations of the International Commission on Radiological Protection (ICRP). The Agency provides advisory services to Member States, such as nuclear plant siting missions. The 1970 decision of the UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) to devote more attention to the evaluation of biological effects of the peaceful uses of nuclear energy will assist ICRP, the Agency and WHO in the review of standards and control measures.

"... ever more energy is required to satisfy basic needs" – Here, the Oskarshamn I 440 MW(e) nuclear power station, in Sweden. Photo: Bo Sundström.





The seas and the air

Of particular interest, of course, are the 'international' sectors of the environment, such as the seas and the atmosphere. As early as 1959 the Agency issued recommendations on the disposal of radioactive waste into the sea. Since 1962 it has been operating an international laboratory in Monaco to evaluate the fate and effects of radioactivity in the sea. It has organized a number of scientific meetings and expert panels on this subject. The development of criteria and procedures is continuing. However, it should be realized that the implementation of any such regulations depends upon the will of governments. In that connection I would like to underline the importance of the recent meeting in Reykjavik, which produced a set of draft articles for a convention for the prevention of marine pollution by dumping. The Agency would consider it appropriate for IMCO to be made responsible for the administration of such a convention. We would be pleased to continue to co-operate with that organization in this as in other activities, and to accept responsibilities that may be assigned to the Agency with respect to radioactive wastes.

In March of this year the Agency's Board of Governors asked me to inform this Conference of the Agency's pre-eminent interest in the elaboration of recommended standards of safety concerning the dispersion into the environment of radioactive waste resulting from the peaceful uses of nuclear energy. The Agency already devotes more than \$1 million a year to environmental programmes.

Regarding the problem of growing plutonium stocks and the risks of diversion, the international control mechanism embodied in the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) offers at least a partial solution. Non-nuclear-weapon States Party to the Treaty agree to accept IAEA safeguards on all their peaceful nuclear activities. Through an agreement with the Agency, each is also obliged to set up its own national system of accounting for and control of nuclear material. The NPT also provides an international framework for the provision of services involving the peaceful uses of nuclear explosions.

(The Director General gave it as the Agency's view that no new international 'machinery' was needed with respect to the impact of nuclear energy on the environment; the IAEA was the international organization established by governments to deal with nuclear matters, which it did in co-operation with other agencies such as WHO, WMO, FAO and ILO. In his view other sectors of environmental concern were, or could be, covered by existing organizations.)

The most urgent problem facing mankind is no doubt the population explosion (he concluded). If the world's population could be stabilized at a reasonable level other questions will find solutions as well. I am thinking of the recycling of materials now wasted, the use of low-grade mineral resources not now considered exploitable and – last but not least – the whole effort to clean up the environment, and to keep it clean. All this requires abundant access to cheap energy, for which fission – and later fusion – offers inexhaustible resources.

Attention must be paid to the safe disposal of radioactive wastes. Here, bulldozers cover a 'burial box' used to isolate highly radioactive process equipment which cannot be decontaminated to a low level at the Hanford Works of the US AEC. Photo: Batelle-Northwest

The IAEA has established very stringent regulations for safe transport, which are in force internationally. Here, a vehicle loaded with a radioisotope container is checked. Photo: AERE Harwell.