

Korea goes as low as reasonably achievable

The growing nuclear power programme in South Korea must be matched by its radiation protection infrastructure. The use of ALARA principles, and a new ALARA Centre will help meet this need.

Korea launched its nuclear programme in 1957, and two years later it became a member of the International Atomic Energy Agency (IAEA). Korea's Atomic Energy Law was promulgated in 1959 on the basis of recommendations from the International Commission on Radiological Protection (ICRP) in its Publication 2.

There are currently nine PWRs and one PHWR operating in Korea. Five more PWRs and three more PHWRs will be operating by the end of the year 2000, and a total of 23 nuclear reactors are planned to be in operation by the year 2006. In addition, there are currently about a thousand nuclear and radiation facilities, including medical centres, which use radiation sources, and these nuclear applications are increasing by 15-20% annually.

Ideally, with such a heavy emphasis on nuclear power as an energy source, Korea's radiation protection infrastructure should develop in parallel with the nuclear power programme. The current radiation protection infrastructure in Korea – both regulations, and mechanisms for administration and enforcement – was established on the basis of the recommendations in ICRP 9 (published in 1965). Korea incorporated the concepts and philosophy of these recommendations into the Korean Atomic Energy Act. It practised the ICRP principles to a certain extent, and it followed the guidelines recommended in the IAEA's *Standards and Measures* in areas such as nuclear power plant operation and emergency preparedness.

More recently, there have been several attempts to incorporate the recommendations in ICRP 26 (1977) into the Korean Atomic Energy Law. However, Korea has found it difficult to implement these recommendations because of its socio-economic situation and the relative inexperience of the Korean nuclear industry in radiation protection.

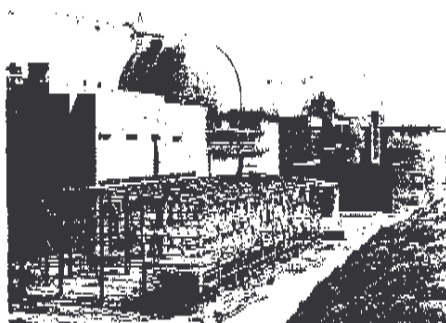
Internationally, in recent years, there has been a globalisation of nuclear safety. Examples are the IAEA's reinforcement programme on radiation protection infrastructure based on the new Basic Safety Standards (which was endorsed by the

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IAEA Board of Governors in 1994), and publication of new recommendations in ICRP 60 (1990). Domestically, Korea is now seriously considering the results of an overall review of its regulatory system for nuclear safety, with emphasis on radiological safety. The review arose out of the increasing safety concerns of the Korean general public and their wish that their environment should be free from possible radiation hazards. The Korean government started the review of nuclear safety in 1992, and as a result the Korean Congress passed a law which requires the implementation of the recommendations published in ICRP 26 to strengthen and reinforce Korea's radiation protection infrastructure, including the use of ALARA (As Low As Reasonably Achievable) principles on exposure.

ALARA AT KEPSCO

As is universally known, "training of trainers" is a time-consuming and elaborate project. Considering the specific situation in Korea, where the lack of natural resources and the dense population have prompted construction of numerous power reactors, the regulatory and advisory body, the Korea Institute of Nuclear Safety (KINS), strongly believes that expert advice from the IAEA will be required to help upgrade the Korean radiation protection infrastructure. This would include support in setting up a Korean ALARA Centre (see overleaf).



▲ ALARA principles will be used at all Korean plants. Above, the Yonggwang site.

As the Agency has identified, the lack of well trained manpower for radiation protection is a major problem for the majority of developing Member States. The Agency concludes that software should be given priority over hardware when providing technical co-operation, because problems finding appropriate manpower meant that many developing Member States were not able to take full advantage of existing equipment and installations.

Even when Korea considers practical measures, such as the guides proposed by the IAEA jointly with other organisations, some difficulties are expected when we try to implement the recommendations of ICRP 60. To overcome these difficulties, we will use the following procedures when implementing the ICRP recommendations:

- Conduct a careful study of the concepts and philosophy recommended in ICRP 60 and of the guides in the IAEA's new *Basic Safety Standards*. Several long-term projects on this subject are now going on, aimed at expediting implementation of the recommendations.
- Factor out problems that conflict with current practice. Classify difficulties that are likely to arise when the recommendations become law and are being implemented. If some practices are immediately feasible, implement them on a first come, first served basis.
- Build the infrastructure required to implement the recommendations quickly. This will include incorporating technical co-operation and advice from countries with well-established infrastructure and practices. It should also include training personnel and exchanging expertise and updated information with IAEA Member States.

As mentioned above, the current radiation protection infrastructure in Korea, its regulations, and its administrative and enforcement mechanisms, were established on the basis of the recommendations of ICRP 9. There have been rapid technological developments in the Korean nuclear industry, and in its September-December 1994 session the Korean Congress passed a law requiring implementation of the ALARA recommendations made in ICRP 26.

The new law has created the necessity to establish a Korean ALARA Centre to work with the Korean nuclear industry, which has little experience with ALARA or its implementation in practice. The aim of the Korean ALARA Centre is ensure that the

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radiation protection infrastructure – specifically the ALARA programme – is effective.

The utility, Korea Electric Power, has its own ALARA programme. This programme is run at each site by an ALARA Committee, which attempts to meet the goals of the dose reduction programme, such as limiting the collective dose to under 200 person-rem (2 person-Sv)/year per unit.

SETTING UP THE ALARA CENTRE

Setting up a Korean ALARA Centre will fulfill a Congressional mandate that the regulatory body should oversee the radiation safety of workers at nuclear facilities licensed by the Ministry of Science and Technology (MOST).

The major objectives of the Korean ALARA Centre will be:

- To act as a centre where information related to ALARA can be deposited, circulated, and retrieved by the nuclear industry.
- To evaluate research on dose reduction and ALARA.
- To focus the attention of the nuclear industry on ALARA and keep it informed about promising dose-reduction efforts.

- To inform MOST of promising research and development (R&D) efforts related to ALARA.

- To monitor efforts to reduce occupational radiation exposure at nuclear facilities in Korea.

However the role to be fulfilled by the Korean ALARA Centre is still evolving. Among the issues that still need to be addressed are the following:

- How a Korean ALARA Centre should be initiated.
- How it should interface with the Korean nuclear industry.
- What should be the main elements of the Centre's initial programme.

To initiate the ALARA programme, Korea plans to make use of an expert who will bring to Korea an outline of ideas on the above subjects. He or she will stay in Korea for a considerable amount of time (at least three months). While in residence he or she should examine the conditions in Korea; consult with appropriate persons, including some from the utilities; develop an outline of ideas; and come up with a draft outline of a specific programme suited to Korean conditions.

The Korean government has sent a formal request for assistance in setting up the Centre, prepared by the KINS, to the IAEA. Assistance is also being sought from Brookhaven National Laboratory in the US through its ALARA Center, which is sponsored by the Nuclear Regulatory Commission. The first step in this collaboration is the visit of an ALARA expert from Brookhaven, who will assist Korea in its programme. The work will be supported by the IAEA Technical Co-operation programme.

The initiation of an ALARA programme in a country with a sizeable nuclear industry is an exhilarating undertaking. In starting from the ground up, one can learn from the experience of other countries. In time, we hope the Korean ALARA Centre will make its own contribution to the betterment of the health of radiation workers everywhere.

The Korean ALARA Centre staff at KINS are grateful for the technical support and devoted collaboration provided by the Brookhaven National Laboratory ALARA Center, and especially Dr Khan's and Dr Baum's dedication in initiating the Korean ALARA programme.