INFORMATION SYSTEM ON OCCUPATIONAL EXPOSURE

Ninth Annual Report

OCCUPATIONAL EXPOSURES AT NUCLEAR POWER PLANTS

1999

FOREWORD

Throughout the world, occupational exposures at nuclear power plants have been steadily decreasing for over a decade. Regulatory pressures, particularly after the issuance of ICRP Publication 60 in 1990, technological advances, improved plant designs, and improved water chemistry and plant operational procedures have contributed to this downward trend. However, with the ageing of the world's nuclear power plants the task of maintaining occupational exposures at low levels has become increasingly difficult. In addition, economic pressures have led plant operation managers to streamline refuelling and maintenance operations as much as possible, thus adding scheduling and budgetary pressure to the task of reducing operational exposures.

In response to these pressures, radiation protection personnel have found that occupational exposures will be reduced by properly planning, preparing, implementing, and reviewing jobs, while applying work management techniques such that the exposures become "as low as reasonably achievable"(ALARA). To facilitate this global approach to work through the exchange of techniques and experiences in occupational exposure reduction, the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD) launched the Information System on Occupational Exposure (ISOE) on 1 January 1992 after a two-year pilot programme. Participation in ISOE includes representatives from both utilities (public and private) and from national regulatory authorities. Since 1993, the International Atomic Energy Agency (IAEA) co-sponsors the ISOE Programme, thus allowing the participation of utilities and authorities from non-NEA member countries. For the past several years, the NEA and the IAEA have formed a Joint Secretariat in order to make the most of the strengths of both organisations for the benefit of the ISOE Programme.

The ISOE Programme includes two parts. First, occupational exposure data and experience are collected periodically from all participants to form the ISOE Databases. Due to the varied nature of the data collected, three distinct but linked databases are used for data storage, retrieval and analysis. Second, in creating the network necessary for data collection, close contacts have been established among utilities and authorities from all over the world, thus creating an ISOE Network for the direct exchange of operational experience. This dual system of databases and communications network joins utilities and regulatory agencies throughout the world, providing occupational exposure data for analyses of dose trends, technique comparisons, cost-benefit and other analyses promoting the application of the ALARA principle.

EXECUTIVE SUMMARY

The ISOE Programme Ninth Annual Report 1999, as it is given here, represents the status of the ISOE Programme at the end of December 1999.

As of the end of 1999, occupational exposure data from a total of 429 reactors (380operating and 49 in cold-shutdown or some stage of decommissioning) from 26 countries representing 77 utilities are included in the ISOE 1 database. In addition, regulatory authorities from 23 countries participate in the ISOE Programme. During 1999, two non-NEA countries, Bulgaria and Pakistan, joined the ISOE Programme with their regulatory authorities. The participation of 380 operating commercial nuclear reactors in the ISOE programme represents 88% of the World's operating commercial nuclear reactors (total of 433).

In 1999, the occupational exposure, in general, followed the downward trend already observed in the last twelve years from 1986 to 1998 or stayed at the already achieved low level. In most of ISOE participating countries, 1999 saw a reduction of the average collective dose per unit. The average collective dose per unit for PWRs slightly increased from 0.98 man·Sv in 1998 to 1.01 man Sv in 1999, for BWRs from 1.74 man·Sv in 1998 to 1.79 man·Sv in 1999 and for CANDU reactors from 0.59 man·Sv in 1998 to 0.85 man·Sv in 1999. For GCR the dose decreased from 0.21 man·Sv in 1998 to 0.15 man·Sv in 1999. In 1999, the average collective dose per reactor for LWGRs (RBMK), represented in the database by two units in Lithuania and one unit in Ukraine, slightly increased from 7.53 man·Sv in 1998 to 8.08 man·Sv in 1999, a value higher than for all other types of reactors.

The average collective dose per reactor for shutdown reactors saw a reduction over the years 1988 to 1999. However, the reactors represented in these figures are of different type and size, and are, in general, at different phases of their decommissioning programmes. For these reasons, and because these figures are based on a limited number of shutdown reactors, it is impossible to draw definitive conclusions.

In 1999, the Technical Centres published a number of ISOE information sheets in order to exchange experience between ISOE participants. To further promote the preparation and distribution of such information sheets, this Annual Report contains short abstracts of recent interesting information sheets such as the replacement of reactor internals and full system decontamination of a Japanese BWR and the experience with the first annual inspection outage of a Japanese ABWR. In addition, a short summary on permanent shielding in a drywell is presented.

The regular meeting of a VVER and RBMK working group under the auspices of the IAEA facilitates exchange of information and experience between operators of VVER and RBMK reactors.

In February 1999, the International ALARA Symposium took place in Orlando Florida, followed by a National ALARA Symposium in February 2000 at the same place and the second EC/ISOE Workshop on Occupational Exposure at Nuclear Power Plants in Tarragona Spain in April 2000. The common objective of these workshops was to communicate experience in ALARA implementation and occupational exposure issues, and to share lessons learned. The international and broad participation in these workshops shows the interest in ALARA and occupational exposure issues.

A new type of ISOE publication, the ISOE Plant Dossier, is available since 1999 and provides each plant with a specific set of detailed information on this plant allowing to compare data with other plants, e. g. of the same sister unit group.

An extended chapter summarises recent developments and principal events in ISOE participating countries.

Finally, the ISOE Programme made significant progress during 1999, particularly in terms of data analysis and output. Details of this progress as well as the programme of work for 2000 are provided in Chapter 3.