The International System on Occupational Exposure, ISOE
Status and Results for 1995

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Introduction

Throughout the world, occupational exposures at nuclear power plants have been steadily decreasing over the past decade. Regulatory pressures, particularly after the issuance of ICRP 60 in 1990, technological advances, improved plant designs, and improved water chemistry and plant operational procedures, as well as other factors, have contributed to this decreasing trend. However, with the ageing of the worlds nuclear power plants the task of maintaining occupational exposures ALARA has become increasingly difficult. In addition, economic pressures have lead 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 by properly planning, preparing, implementing, and reviewing jobs, occupational exposures can be kept as low as reasonably achievable. To facilitate this global approach to work, sometimes referred to as Work Management, 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 program. This four level data base joins utilities and regulatory agencies throughout the world, providing occupational exposure data for trending, cost-benefit analyses, technique comparison, and other ALARA analyses.

The ISOE Structure

The ISOE system consists of four data bases of occupational exposure information. Data is collected via user-friendly computerised questionnaires, and accessed via a Windows-based, relational data base system. The first data base, NEA 1, concerns operating reactors, and those in cold shutdown (stored separately). For each participating reactor various radiation protection performance indicators: total annual collective dose, non-outage annual collective dose, outage annual collective dose divided into 20 job categories and 75 sub-categories, annual collective man-hours and number of workers associated with each job category and sub-category, and annual individual dose distribution are included. Although not all reactors provide data for all categories, all the data provided are updated annually.

The second data base, NEA 2, contains for each participating reactor information concerning methods and techniques used for dose and dose rate control. Primary water chemistry, cobalt replacement/reduction programs, primary water filtering, surface preconditioning, decontamination, work practices, ALARA organisation and management, tools and procedures, and motivation and training practices are listed. The dosimetric effect of each practice is quantified as best possible. This type of information normally evolves rather than changes, thus this data base is updated by the participating utilities on an as needed basis. Information for this data base is still in the process of being collected.

The third data base, NEA 3, contains details on the dosimetric results of specific operations. Items as large as the removal of the reactor temperature detector bypass system, or as specific as reactor vessel head control rod drive penetration inspections have been the subjects of NEA 3 reports. Important radiological aspects of the operation, and the name, address, and phone number of a contact person for further information are listed. The participating utilities are encouraged to complete NEA 3 reports as often as they perform operations with interesting radiation protection aspects.

The fourth data base, NEA D, is not yet operational. This data base will contain information similar to that contained in NEA 1, however exclusively for plants which are definitively shut down or are in some phase of decommissioning. It is hoped that this data base will be operational in early 1996.

Current Status of Participation

As ISOE nears the end of its fourth full year of successful operation, its list of participants continues to grow, and currently includes 59 utilities from 19 countries, and 14 national regulatory authorities. Additional data from some non-participating reactors is collected from published reports, such that the data base now represents approximately 350 reactors (over 80% of the operating reactors world-wide), including PWRs, BWRs, CANDU reactors, and GCRs. The data base also includes 34 definitively shut-down reactors.

In terms of ties between ISOE and other organisations, the International Atomic Energy Agency (IAEA) cosponsors ISOE for non-NEA Member countries, the European Commission (EC) and the NEA have signed a co-operative agreement such that the ISOE data base now also serves the European Community's data needs, and the Paris Centre of the World Association of Nuclear Operators (WANO-PC) and the NEA have signed a Memorandum of Understanding to assure co-ordination of the activities of the two organisations in the field of occupational exposure. Finally, to administer the collection and distribution of data, a system of Regional Technical Centres has been established. This includes the IAEA for non-NEA Member Countries, the Nuclear Power Engineering Corporation (NUPEC) for the Asian Region, the Centre d'Etude sur l'Evaluation de la Protection dans le Domaine Nucléaire (CEPN) for the European Region, and the University of Illinois for the North American Region.

Thus ISOE has a wide following and is the most complete occupational exposure data base in the world. The value of such a widely used system is its ability to efficiently facilitate the exchange of occupational exposure reduction experiences and practices among participants.

The Use of the ISOE System and Network

There are several diverse ways in which ISOE can be used by its participants. The ISOE System, consisting of the four data bases and their associated software, can be used for statistical and comparative studies, and as a source of good practices and experiences. As a brief example of the type of data available through ISOE, below are listed the average annual collective doses, per reactor, for various countries and reactor types participating in ISOE, as well as a figure showing the progression of various doses and durations associated with steam generator replacements around the world.

The ISOE Network, which consists of all Participating Utilities and Authorities, Regional Co-ordinators for certain countries, and the ISOE Technical Centres, serves as an open line of communication for the real time exchange of data, experiences, policies, practices, etc. Participants interested in the experience of others in specific areas not already covered in the data bases may request that the Technical Centres solicit the needed information. Participating utilities, authorities, and national ISOE co-ordinators are then contacted by the Technical Centres and the resulting information is passed on to the requester, and made available to all other participants.

In addition, ISOE Expert Groups are established from time to time to perform specific studies based on participant's needs. For example, many companies have adopted a very global approach to their work, stressing the importance of approaching jobs from the multi-disciplinary team perspective, and of following jobs completely through the stages of conception, design, planning, preparation, implementation, and follow-up. By focusing such attention on jobs, their successful completion - on schedule, within budget, with a sufficient level of quality, with minimum cost, and with a maximum chance of fulfilling the originally desired goal - can be assured. This multi-disciplinary, start-to-finish approach to jobs can be broadly termed ***Work Management***. To facilitate the application of Work Management principles in the nuclear industry, an NEA ISOE Expert Group is currently preparing a "Handbook of Good Practices". In each of seven areas, this Handbook describe what is currently seen as good practice, and will cite specific case studies to illustrate the techniques used to quantify the impacts of work management actions in that particular area. The areas addressed by the Handbook are; 1. Work Management Policy, 2. Regulatory Issues, 3. Worker Involvement, 4. Work Selection and Planning, 5. Work Preparation and Scheduling, 6. Work Implementation, and 7. Assessment and Feedback.

The Annual ISOE Steering Group meeting includes a Topical Session during which current issues of interest to the participants are presented and discussed. Recent topics have included steam generator replacements, fuel failure, chemical decontamination, and electronic dosimetry.

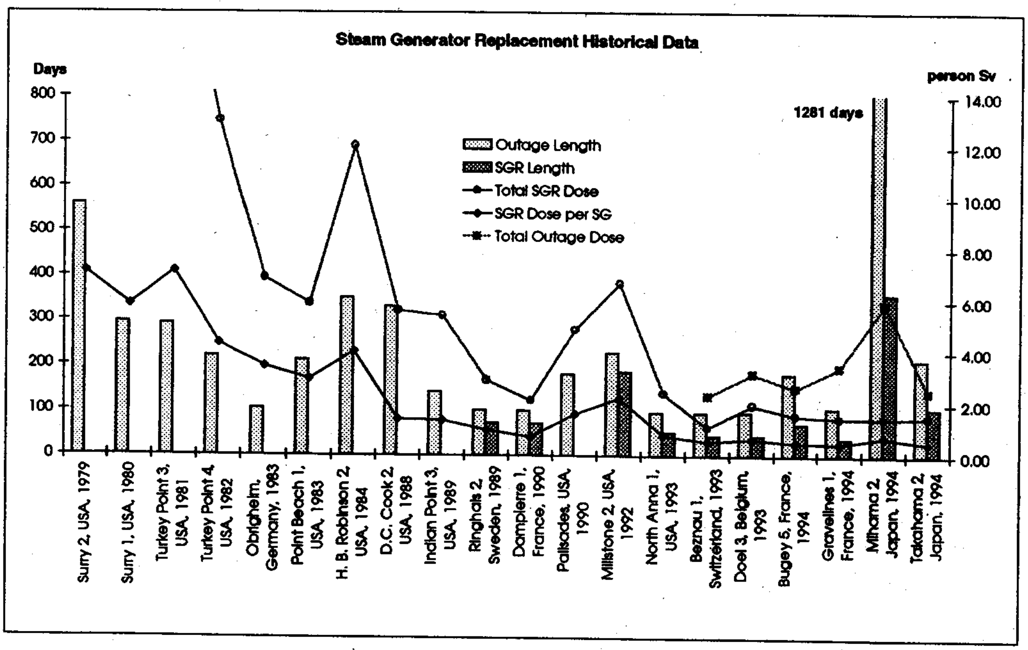
Conclusion

After four years of operation and expanding participation, the ISOE system has entered a period of "usefulness and stability". Continued growth, and efforts by all participants to deliver timely and useful information, will help to assure that ISOE remains an up-to-date conduit for the exchange of occupational exposure experience throughout the world.

Average annual collective dose per operating reactor by type for a number of countries in 1994 (in man Sv)

	Country	PWR	BWR	CANDU	GCR
OECD	Belgium	0.98			
	Canada			1.12	
	Finland	1.17	1.20		
	France	1.74			
	Germany	2.25	2.15		
	Japan	1.07	1.58		0.23
	Mexico		6.03		
	Netherlands	1.82	0.85		
	Spain	1.77	3.94		
	Sweden	0.64	1.71		
	Switzerland	0.79	2.31		
	United Kingdom				0.31[1]
	USA	1.34	3.27		
Non-OECD	China	0.65			
	Czech Republic	0.35			
	Hungary	0.39			
	South Africa	0.81			

[1]: *Some collective dose data from the UK are missing from the ISOE data base.*



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