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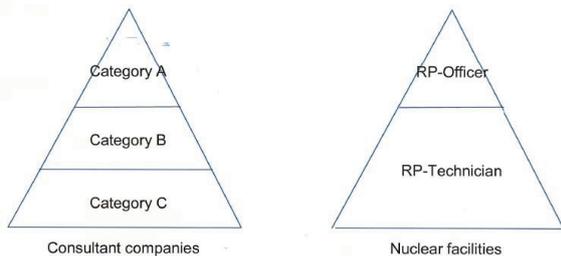
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Education and Training of Radiation Protection Personnel

At the 2008 ISOE European ALARA Symposium (24-27 June 2008: Turku, Finland), Virva Nilsson of Forsmarks Kraftgrupp AB presented the results of a project on improving education and training of RP technicians and officers in Sweden. Ms. Nilsson's presentation was recognised as a Symposium Distinguished Paper, the main content of which is presented below.

Introduction

Nuclear facilities in Sweden have their own radiation protection (RP) personnel, as legislated, but according to the Swedish system, additional personnel needed during annual outages etc., are hired from a number of consultant companies.



While the nuclear facilities' own RP personnel are categorised in two different categories (RP Technician, RP Officer), external RP personnel in Sweden are categorised in three different categories. In the latter case, RP Technician Category C is the lowest, and RP Technician Category A, corresponding to the nuclear facilities' RP Officer, is the highest.

In 2002, the heads of the RP groups at Swedish nuclear facilities and representatives from the RP consultant companies discussed the education and training (E&T) of external RP personnel. This discussion resulted in co-operation between the different nuclear facilities and consultant companies with respect to the E&T of radiation protection technicians (RPT) and officers (RPO). In 2003, a joint work group called "FORS" was launched with the idea that the nuclear facilities, together with the consultant companies, construct an education programme based on an analysis done at all levels of E&T.

The first task for the FORS group was to create a foundation for a renewed education programme for A-Technicians/ RP Officers, the so-called "FS-1" course. This education was traditionally executed by Kärnkraftsäkerhet och Utbildning (KSU), a company owned by the nuclear facilities in Sweden. However, the material, requirements and goals for the course had not been audited in a number of years. The work was therefore started with a detailed task analysis on all levels of education of RP personnel, resulting in a number of standard competence areas.

Education for RP Technician Category C

Based on the task analysis, Category C education was revised according to the following areas: "Radiation Protection", "Hot Work", Life-saving / first aid, safety information, reactor types in operation in Sweden (BWR, PWR), personnel decontamination, waste management, radiation environment at NPP's, classification of areas and a one-week practice period at a nuclear power plant (by schedule). The course comprises one week of class room work followed by a written exam two weeks later.

Education for RP Technician Category B

According to questionnaires made among RP Technicians Category B, there is a lack of knowledge needed for Category A education. Traditionally there has been a larger gap between the level of education for RP Technician Category B and the next step, Category A/RP Officer.

The most extensive part of the work of the FORS group was therefore to create a new foundation for B-education, as well as produce the associated materials for students and instructors. The work resulted in two books. The first concerns radiation physics, radiation biology, RP operations at the facility, regulations and guidance (including ICRP, ISOE, national legislation etc.), classification of areas, RP instruments, transport of radioactive material, waste management, conventional working environment, arithmetical problems to solve and group work. The second book concerns BWRs and PWRs (the reactor types in operation in Sweden) and a short description of other common reactor types. The course comprises one week of class room followed by a written exam two weeks later.

Before being qualified to take part in an B-education, a student has to have at least 16 work weeks of practical experience at the facility as an RP Technician Category C, including at least two in the controlled sub-areas of the NPP, Spent Fuel Storage or Transport.

Education for RP Technician Category A/RP Officer

The renewed education programme for A-Technicians/RP Officers includes: Radiation physics, measuring techniques and theory, measuring techniques practice, radiochemistry, radiation biology, ICRP etc., ALARA in practice, legislation etc., and ISOE and RP experiences from around the world.

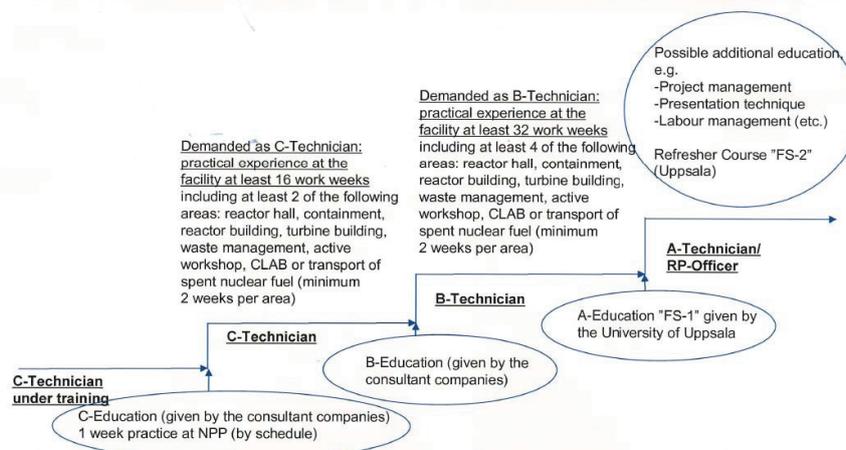
The course includes two weeks at a university followed by self study and examination through extensive homework instead of an exam. Before being qualified to take part in the A-education programme, the student has to have at least 32 work weeks of practical experience at the facility as an RP Technician Category B, including at least four in the typical radiation controlled areas of the NPP, Spent Fuel Storage or transport.

The pilot course was launched in April 2004, followed by a modified course in April 2005, based on feedback from the first course. The course has been repeated at least once a year since 2004.

The need for further education was identified during the examination and revision of the FS-1 course. As it is fully possible that personnel may have taken part in an FS-1 course many years ago but not in any higher RP education since then, a so-called FS-2 course has been created. The main features in the FS-2 course are to repeat some basics, reinforce existing knowledge and skills, and provide a forum for discussion and exchange of experiences within the country and internationally.

General Results and Future Challenges

The line of education and training for RP Technicians and Officers in Sweden can be expressed as "stairs", where the knowledge and skills of the lower step leads to and is included in a higher one:



Based on the work of the FORS group, all Swedish nuclear facilities have standardised the requirements on RP personnel at all levels. The work of the FORS-group is considered very valuable for the RP professionals. Additionally, it is considered important to attract the younger generation to become a lasting part of this profession and to be willing to continue to educate themselves within it.

This paper, as well as the other presentations from the 2008 ISOE European ALARA Symposium, are available on the ISOE Network website.

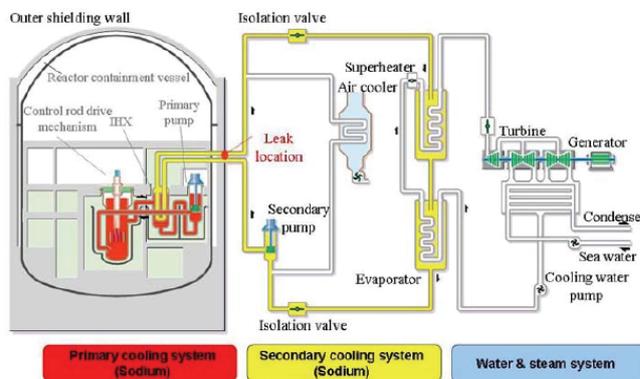
Upcoming ISOE Meetings and Symposia

2008 ISOE Annual Management Board Meeting and 2008 International Symposium

The 2008 annual ISOE Management Board meeting will be held in Kyoto, Japan from 10-12 November 2008. In addition to country reports from the ISOE National Coordinators on radiological protection activities of interest, the Management Board will address such topics as ISOE achievements and the programme of work for 2009, the migration of the ISOE database and data entry to the ISOE Network, a proposal for improving the data collection and analyses for shutdown reactors, and a new ISOE report on "Work Management to Optimise Occupational Radiation Protection in the Nuclear Power Industry". This will be followed on 13-14 November by the 2008 International ISOE ALARA Symposium, organised by the ATC and co-sponsored by NEA and IAEA, in Tsuruga, Japan (information on www.isoe-network.net). The Symposium will address:

- Source Term Reduction;
- RP Experience in Nuclear Power Plants;
- Radiation Control.

A technical tour to the prototype fast breeder reactor, Monju, JAEA, will take place on 12 November.



Prototype Fast Breeder Reactor Monju

The Japan Atomic Energy Agency, JAEA, promotes research and development of fast reactor (FR) cycle technology with the knowledge that excellent performance, good economics and reliability are necessary for this technology to be accepted by society. JAEA has taken a step-by-step approach for this development. The first step was the Joyo experimental reactor, and the second was the Monju prototype reactor.



2009 ISOE North American Regional ALARA Symposium

The 2009 ISOE North American Regional ALARA Symposium, organised by NATC, will be held 12-14 January 2009 in Fort Lauderdale (USA). More information, including a call for papers, can be found on the ISOE Network (www.isoe-network.net).

2009 ISOE International ALARA Symposium

The 2009 ISOE International ALARA Symposium, organised by the IAEA Technical Centre, will take place 12-16 October 2009 in Vienna (Austria).

Upcoming ISOE Publications

- Occupational Exposures at Nuclear Power Plants: 17th Annual Report of the ISOE Programme, 2007 (OECD/NEA 2008), *in press*
- Work Management to Optimise Occupational Radiation Protection in the Nuclear Power Industry (OECD/NEA 2008), *in press*

International Radiological Protection Association – IRPA

The 12th IRPA Congress will take place in Buenos Aires in October 2008. The congress is organised by the Argentine RP Society in cooperation with IAEA, WHO and PAHO. The main IRPA 12 theme is "Strengthening Radiation Protection Worldwide" (information on www.irpa12.org.ar).