Statens strålskyddsinstitut
Swedish Radiation Protection Institute

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The Swedish Radiation Protection Institute's General Advice on the Competence of Radiation Protection Experts;

given on May 26, 2000.

1. General

These general advice are based upon the Commission's Communication, OJ C 133, April 30, 1998 concerning the implementation of Council Directive 96/29/Euratom, regarding qualified experts.

By the mentioned directive it is presumed that those who conduct practices with ionising radiation have got an expert available, in the directive mentioned "qualified expert" as an adviser in the radiation protection work. Anyone who conducts a practice with ionising radiation shall, according to the Radiation Protection Act (1988:220), ensure that those who are working with radiation have got the education needed and know the measures to be taken in order to keep the radiation protection on a sound level. These general advice may therefore also serve as a help in creating curriculum for education of the personnel.

The Commission's communication comprises a list of items that should be part of the competence of a qualified expert. At the same time it is said that the scope and the level of competence depends on the kind and extent of the practice as well as the complexity of the action needed and expected from the expert. An obvious example is that if the practice consists of radiography with x-rays only, the expert does not need to have a good grasp of the handling of radioactive substances, contamination or the regulations on transport of radioactive substances.

If the practice is extensive and complex the expert should possess a wide and high competence and experience. This is the case in medical care where the qualified expert, according to special regulations, shall be an authorised medical physicist, who is experienced and has many years' education at a university level. A similar situation is present in the nuclear power industry.

The qualified expert also should know the legal system that governs the practice and the applicable regulations. The expert should follow the coming into being of new regulations and the technical progress in the field and, when needed, up-date the knowledge.

The person that holds the post as an expert should be able to smoothly collaborate with the management and the personnel. The expert is expected to be able to educate the personnel in matters that affect the working methods and also be able to explain and

give cause for the various radiation protection measures to be taken. This touches matters on the risks with radiation in relation to other risks in society, and what strategies society uses in order to reduce risks. Thus ability to communicate with the personnel is important.

Generally, the Swedish Radiation Protection Institute presupposes that an expert has a university degree, or equivalent, with focus on physics, technology (Master of Engineering), chemistry or biology and in addition an appropriate course on radio physics according to clause 2.1 below and, if applicable, further clauses.

The expert should by the licence holder be granted a position in matters concerning radiation protection that is independent of production goals and other businesslike considerations.

2. Basic education

2.1 Topics that should be part of all courses

Basic atomic and nuclear physics
Basic biology
Interaction of radiation with matter
Biological effects of radiation
Radiation physics concepts, quantities and units:
- the protection quantities effective dose, equivalent dose and committed equivalent dose, as well as measurable quantities (absorbed) dose, ambient- directional- and personal dose equivalent

The basic principles of the International Commission on Radiological Protection (ICRP)
- justification
- optimisation
- dose limits

Risk communication and risk reduction
The background to radiation protection standards:
- epidemiology
- the linear hypothesis for stochastic effects
- deterministic effects

Detection and measurement methods
- instruments: calibration and function tests
- personal dosimetry
- check of contamination
- uncertainties and limits of detection

Different kinds of sources
- sealed sources
- unsealed sources
- x-ray equipment
- accelerators

Organisation of radiation protection
- the role of the qualified expert
- safety consciousness and ability to instil safety culture into others

recording and reporting (sources, doses, abnormal events)
categorisation of workers
delimitation of workplaces
quality assurance

2.2. Topics that could be selected depending on the practice

Risk assessment
also impact on the environment
Setting risks at a minimum level
Limitation of releases
Monitoring
area monitoring
biological monitoring
The concept of critical group
dose calculations for critical group
Measures in emergency situations
Decontamination
Analysis of incidents and accidents on order to prevent recurrence
Handling of radioactive waste
Transport of radioactive substances

3. Topics that should be included for certain kinds of practices and where higher studies might be necessary

Optimisation - ALARA
Internal dosimetry - dose factors
Specific physiology of inhalation and ingestion
Dose monitoring of workplaces
Special problems related to decontamination
Containment/filtration
Environmental monitoring
Potential exposure - accidents
Interventions in emergency situations
Decommissioning

4. Topics related to specific practices

4.1 Nuclear technology

Basics
fission and fusion process and products
reactor engineering
neutrons - properties and detection
criticality
handling of spent fuel and other radioactive or contaminated or fertilised objects
Further education on handling of fuel
toxicity of elements with large Z-numbers
spent fuel

4.2 General industry and research

Use of sealed sources
- limitation of access to areas
- transport of mobile devices containing radioactive sources
- service
- potential exposure

Unsealed sources
- hazards of isotopes production and use
- hazards of inhalation and contamination
- special waste management aspects
- special hazards associated with natural radiation

Design of experiments and development work

X-rays - special problems (e.g. crystallography)

Hazards of isotopes production and use

4.3 Medical care

According to the regulations of the National Board of Health and Welfare on authorised medical physicists

4.4 Accelerators

Special problems of radiation detection and measurement

Control of access

Safety systems

Other special design and shielding matters

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