

# UK arrangements for Radiation Protection in the Nuclear Industry

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## 1. Introduction

Dose reduction for nuclear workers is keenly progressed within the UK nuclear industry since inception of nuclear power in the late 1950s.

Legal requirements led to involvement by unions, specialists, regulators and workers, successfully reducing doses considerably.

## 2. The Ionising radiations Regulations

The Ionising Radiation Regulations (IRR) require risk assessment of all radiation exposure. They also require Radiation Protection Advisor (Qualified Expert) and Radiation Protection Supervisor to have special roles in arrangements to protect workers.

The IRR takes in all relevant directives to date and require notifications, training, supervision, protective equipment, health surveillance, records and all other arrangements. The main themes of IRR are:

*Prior Risk Assessment  
Restriction of Exposure  
Maintenance and Examination of Engineering Equipment and Personal Protective Equipment  
Contingency Plans*

### Dose reduction in the UK

The Office of Nuclear Regulation, ONR (formerly the Nuclear Installations Inspectorate, NII) of the Health and Safety Executive (HSE), regulates nuclear sites for nuclear safety. It also regulates radiation protection against our Ionising Radiations Regulations (IRR).

The Environment Agency regulates environmental compliance and disposal of radioactive waste. Regulators are keen to see doses reduced further, making performance indicators and reviewing event reports to ensure lessons are learnt and broadcast to other sites.

Employers must provide safe work arrangements, protective equipment and adequate supervision. In doing so, regulators are vigilant and call for dose targets for site and projects. Dose targets have incentives and are presented widely, including to the local community. All operators, are proud of their reductions in doses and go beyond the monetary value of the dose to achieve further reductions:

The employer establishes facilities and provides a positive safety culture: training, dose restriction measures, protective clothing and dosimeters. Successful parts of these arrangements are:

*Positive 'No Blame' safety culture to reduce radiation dose  
Prompt investigation, event reporting and learning  
Appoint Duly Authorised Persons  
Focus for improvements in dose restriction*

### Radiation Protection Advisor

In our regulations since 1985, radiation protection advisors (RPAs) have a raised profile. Accredited against HSE values, applications require a challenging, submission and expert panel review. This is either by operator schemes, or RPA2000 the Society for Radiological Protection (SRP) scheme (Appendix 1). HSE authorise all schemes. RPAs must develop and retain competency to maintain accreditation and have to reapply, demonstrating knowledge and competence, every 5 years:

*A strong personality: highly integrated, knowledgeable and able to balance differing interests.  
Sound experience, able to apply competence.  
Regularly updates and extends competence.  
Particularly in new and developing areas of work.*

### Radiation Protection Supervisor

The radiation protection supervisor has a special role in ensuring arrangements to protect workers:

*Appointed in writing  
Trained and qualified  
Knows regulations, local information and circumstances  
Has management authority  
Supervises radiation work and workers  
Vigilant to reduce radiation dose  
Focus on improvements to restrict dose  
Know emergency arrangements*

### Arrangements for radiation protection on nuclear sites

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### Health Physics:

Provide radiological advice directly to site project teams: design work; characterisation; operational advice, etc to ensure high standards of protection consistent with ALARP, legislation and standards.

Radiological environmental compliance, including clearance and exemption management, acting as Qualified Experts:

*Experienced RPAs for different work areas  
Also accredited health physicists to support  
Some operators have in house (approved) schemes for accreditation  
Most use RPA2000 – SRP scheme*

### Company RPA Body:

Company Radiological Safety Rules (and supporting documents) are produced by the RPA Body and are the main source of RPA advice for the company.

The RPA Body acts independently from the company, which also has a site RPA body.

The site RPA body operates within the health physics section reporting to the lead team manager

The lead team manager reports directly to site director

## 5. Discussion and conclusion

### Reduction in collective dose since IRR9

This continues to present day.

Radiation levels rising on operational plant.

The UK has adopted a sound system of radiation protection.

Since inception, there is downward pressure on radiation dose, which continues.

The RPA role is key in establishing sound advice.

Industry generally goes much further to reduce radiation dose that monetary value, to gain support of regulators and work force.

## 3. Control of work on nuclear site

Health physics work with production departments and add radiation safety advice to all work with radiological implications

Work order cards identify need for radiation safety.

Risk Assess

Use template advice – can adapt

Correct radiation safety advice and support

Conflicts resolved

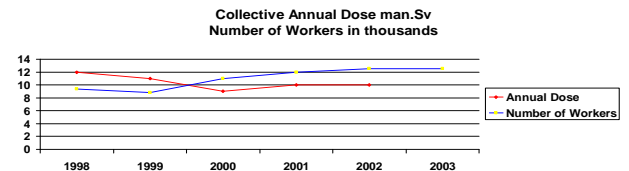
## 4. Dose reduction since the start of IRR99

It's difficult to compare doses received with time:

*Arrangements for monitoring dose differ at most sites  
Sensitivity of dosimeters improved and gave rise to apparent dose reductions.  
Dose statistics are not readily available  
As plant ages dose rates will increase.*

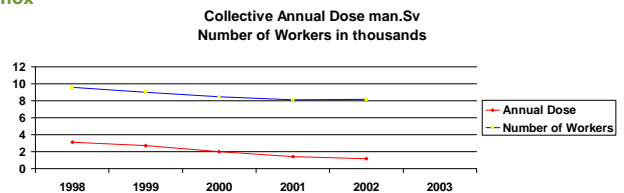
Nevertheless, we can show a steady reduction in worker dose since the IRR started in January 2000:

### Sellafield



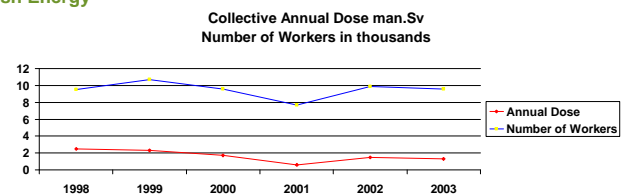
'a decrease in collective dose against an increase of work (number of workers)'

### Magnox



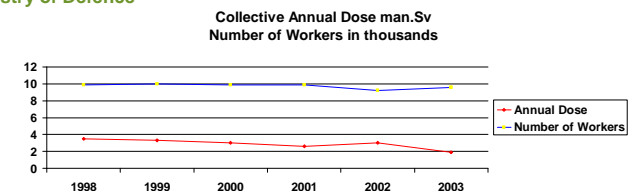
'a marked decrease in annual dose'

### British Energy



'annual dose decreasing against a background of increasing reactor life'

### Ministry of Defence



'a marked reduction in dose'