



## Certification of industrial radiography operators in Norway

Tor Wøhni and Gunnar Saxebøl  
Norwegian radiation protection authority

Norwegian Radiation Protection Authority



## IAEA Categorization of sources.

IAEA-TECDOC-1344

### *Categorization of radioactive sources*

Revision of IAEA-TECDOC-1191, Categorization of radiation sources

INTERNATIONAL ATOMIC ENERGY AGENCY



July 2003

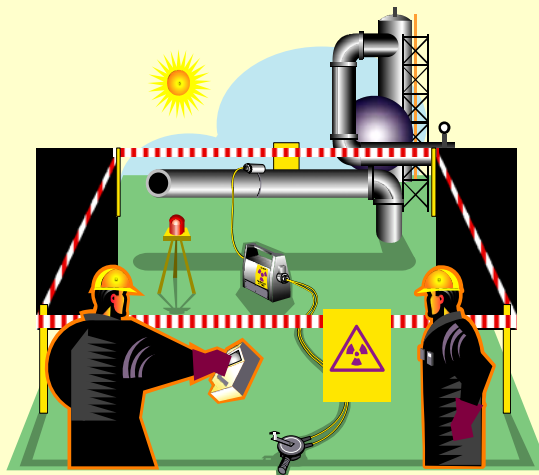
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## Norwegian inventory of category 1 & 2 sources

|                              | Number of undertakings | Number of sources | IAEA Category |
|------------------------------|------------------------|-------------------|---------------|
| Irradiation facilities       | 1                      | 1                 | 1             |
| Blood irradiation facilities | 9                      | 9                 | 1             |
| Gammknife                    | 1                      | 1                 | 1             |
| Teletherapy                  | 2                      | 2                 | 2             |
| Industrial radiography       | 88                     | 198               | 2             |
| Brachytherapy (afterloading) | 4                      | 4                 | 2             |
| <b>Total</b>                 | <b>105</b>             | <b>215</b>        |               |

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## Industrial radiography



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## Container for gamma radiography



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## Industrial radiography source



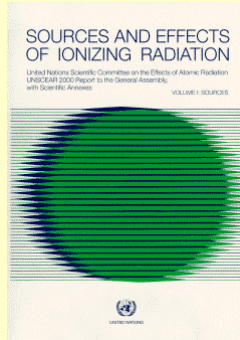
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### Statistics from Norwegian industrial radiography (April 2005)

|  |            |
|--|------------|
| <b>Industrial radiography licences<br/>(i.e. number of undertakings)</b> | <b>88</b>  |
| <b>Radiation protection certified operators</b>                          | <b>518</b> |
| <b>Operators without radiation protection certification</b>              | <b>31</b>  |
| <b>Containers for gamma radiography</b>                                  | <b>198</b> |
| <b>X-ray machines</b>  | <b>187</b> |
| <b>Companies having one or more shielded enclosures</b>                  | <b>42</b>  |
| <b>Total number of shielded enclosures</b>                               | <b>63</b>  |

## Accidents with clinical consequences to occupationally exposed workers 1975 – 2000 (Global statistics from Unsear 2000)



| Field of application                            | Number of acc. |
|---|----------------|
| Nuclear fuel cycle                              | 9              |
| Industrial radiography                          | 36             |
| General industrial use (apart from radiography) | 29             |
| Tertiary education and non industrial use       | 13             |
| Medical use of radiation                        | 12             |
| <b>Total number</b>                             | <b>99</b>      |

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## Accident with clinical consequences



FIGURE 2. Dark erythema with dry desquamation starting at the nipple on Day 22.



FIGURE 3. Necrosis of the epidermis on Day 23 (the white spots after silver nitrate).

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## **Industrial radiography – regulatory regime 1**

- **All operators (i.e. industrial radiographers) are required to hold a radiation protection certificate.**
- **Previously (before January 1st. 2005) the certificates were issued by the NRPA.**
- **From January 1st.2005 this function is delegated to external, accredited certification bodies, i.e. bodys operating certification of persons.**

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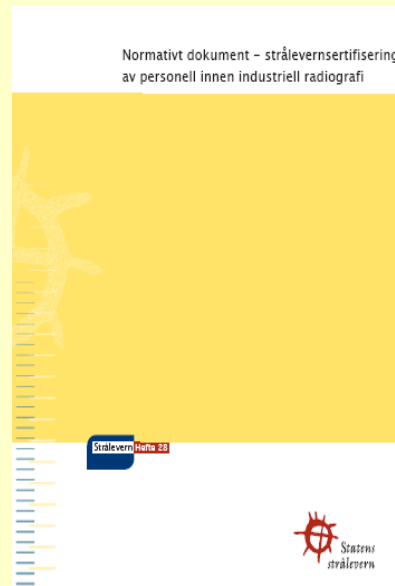
## **Industrial radiography – regulatory regime 2**

- **The certification body must be accredited for this particular personnel certification function, based inter alia on a "Normative document".**
- **The "Normative document" describes the necessary radiation protection training and qualifications of the industrial radiography operators. It also presents a standardized content for a 35 hour training course, and a description of the examination and evaluation procedure .**

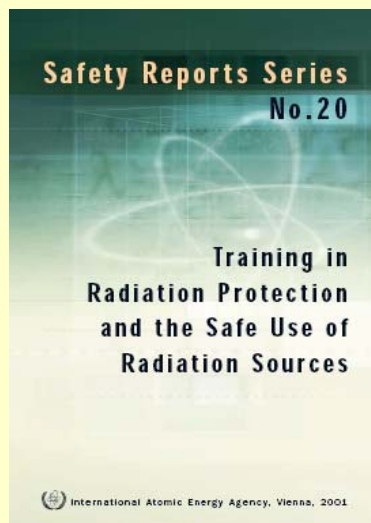
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- **Normative document: Radiation protection certification of Industrial radiographers.**
- **Prepared by the Norwegian radiation protection authority in cooperation with the Norwegian society for non-destructive testing.**



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Annex III

CLASSROOM BASED TRAINING IN RADIATION PROTECTION FOR INDUSTRIAL RADIOGRAPHERS

This annex shows a simplified version of the design and development of a training course in radiation protection for industrial radiographers. A general outline of the main elements of the design and development is given, but no attempt is made to describe them in detail.

III-1. TARGET AUDIENCE

The target audience for this course is industrial radiographers and assistant radiographers performing gamma and X ray radiography on-site and in shielded enclosures.

III-2. AIMS

The aim of this course is to provide a basic awareness of the radiation hazards associated with industrial radiography using gamma and X ray devices, performed on-site and in shielded enclosures. It also gives practical guidance on acceptable work practices to keep doses in accordance with regulatory requirements and on appropriate actions in abnormal conditions.

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## Competence requirements for certification

- Regulatory requirements for using radiation sources for industrial radiography.
- Basic properties of X-and gamma radiation.
- Radiation output of the various kinds of radiation sources, and be able to use this information for dose calculations.
- Hazards and health effects from ionizing radiation.
- Radiation protection terminology
- Regulations for transport of radioactive sources, to a level corresponding to the specialized course for class 7.
- Basic principles for radiation protection, and be able to performed calculations with time, distance and shielding.
- Use of radiation protection instrumentation.
- Practical means for operational dose reduction.
- Correct work procedures with regard to measurements of radiation levels, erecting barriers, daily control and use of sources and equipment.
- Service, maintenance and calibration of equipment.
- Be able to detect abnormal situations, and to make the proper corrective actions.
- Reconstruction and dose estimations in connections with accidents.
- Writing reports and keeping logbooks

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## Personell certification bodies.

- There are presently 2 personnel certification bodies which have been accredited on the basis of the described normative document, together with standard NS\_EN ISO/IEC 17024: Conformity assessment – General requirements for bodies operating certification of persons.
- One of the certification bodies are operating in Norway, and have been accredited by "Norsk akkreditering". The other is based in Sweden, and have been accredited by Swedac.

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## Certification procedure

- In principle, any operator may apply any of the two certification bodies for a certificate, on the basis of documentation of qualifications.
- In practice, most applicants attend one of the two established 35 hour training courses in Norway.

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## Statistics from the certification process

| Certification body | Time of accred. | Number of exams | Number passed | Number failed |
|--------------------|-----------------|-----------------|---------------|---------------|
| A                  | Sept. 2004      | 36              | 27            | 9 (25 %)      |
| B                  | Spring 2004     | 141             | 114           | 27 (19 %)     |

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## Industrial radiation protection certificate

| INDUSTRIAL RADIATION PROTECTION CERTIFICATE  |   | EUR/CERT                           |                                    |
|--|---|------------------------------------|------------------------------------|
| <b>Number:</b>   | EC-119  | <b>Date of issue:</b>              | 11-Aug-2008                        |
| <b>Date of expiry:</b>   | 11-Aug-2011                                   | <b>Date of examination:</b>        | 11-Aug-2008                        |
| <b>Torbjørn Jagland</b>  |   |                                    |                                    |
| <b>Address:</b>  |   |                                    |                                    |
| Håkonsvollveien<br>123 OSLO<br>Norway  |   |                                    |                                    |
| <b>Date of birth:</b>  |   |                                    |                                    |
| 1-Jan-1971   |   |                                    |                                    |
| Signature holder of certificate  |   |                                    |                                    |
| The certificate holder fulfills all requirements of NRP's report no. 28-2004 of 2004-02-24, Normative document - Radiation protection certification of industrial radiographers.   |   |                                    |                                    |
| <b>The certificate is supplemented by:</b>   | None  |                                    |                                    |
| <b>The certificate is limited to:</b>  | None  |                                    |                                    |
| The certificate is based on: Examination   |   |                                    |                                    |
| The certificate is valid only with employers periodical authorisation (every second year) entered below, confirming that the conditions of NRP's report no. 28-2004 for uninterrupted validity of the certificate are fulfilled. |   |                                    |                                    |
| <b>Initial certification body:</b>   | <b>Operating authorization by employer:</b>   |                                    |                                    |
| Eurocert AS  | NDT Testing AS Kristiansand                   |                                    |                                    |
|  | Lambertveien<br>4021 KRISTIANSAND S<br>Norway |                                    |                                    |
| Operating authorization by employer (date and signature):  |   |                                    |                                    |
| Eurocert AS<br>Lambertveien 51a<br>4021 KRISTIANSAND S<br>Norway<br>ME: +47 38 29 83 90<br>fax: +47 380 16 2 11<br>e-mail: eurocert@eurocert.no<br>home: www.eurocert.no   | Signature (level, covered 03/2008)            | Signature (level, 04/2008)         | Signature (level, covered 04/2008) |
|  | Signature (level, covered 03/2008)            | Signature (level, covered 03/2008) | Signature (level, covered 03/2008) |

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## Conclusive remarks 1

- The majority of international reported serious accidents within industrial radiography are caused by operator errors or failures to follow procedures, while a minor part is caused by technical equipment failure alone.
- The established system for operator certification are important for maintaining a high standard of radiation safety in industrial radiography.
- We think that transferring the certification process to accredited external bodies will improve the system for maintenance of competence and training of the certificate holders - as the certification system now conforms with the general international principles for personnel certification as described in ISO/IEC 17024.

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## Conclusive remarks 2

- Outsourcing the certification system also represent less administrative burden on the NRPA.
- In line with the current political trends:  
Stortingsmelding (white paper) nr.17- 2000-2003 concerning governmental regulatory supervision:  
"The objective is to terminate traditional systems for governmental regulatory supervision in areas where these with advantage could be replaced , or at least reduced, by alternatives like f.in. accreditation or certification".

## The end

- Thank you for the attention