



# The Information System on Occupational Exposure in Medicine, Industry and Research (ISEMIR)

## INDUSTRIAL RADIOGRAPHY



ISEMIR is Information System on Occupational Exposure in Medicine, Industry and Research.

ISEMIR-IR is a tool for radiation protection optimization in non-destructive testing companies carrying out industrial radiography (IR). ISEMIR-IR is developed as a web-based tool for regular data collection and analysis of occupational doses for individuals in IR, and for the use of this information to improve occupational radiation protection.

It assists IR facilities in benchmarking their arrangements in radiation protection and safety, and hence in promoting of, implementation of optimization of occupational radiation protection.

### Why is ISEMIR-IR focused on industrial radiography?

Industrial radiography work by its nature is often carried out under difficult working conditions, such as in confined spaces or extreme cold or heat or working at night. Working under such adverse conditions might result in operational situations in which occupational radiation protection may be compromised. Experience shows that incidents involving IR sources have sometimes resulted in high doses to workers, causing severe health consequences such as radiation burns and, in a few cases, death.

It has been long known that there is significant potential for IR personnel to receive non-trivial occupational exposure. As such, it is of utmost importance to have a mechanism to ensure sharing and exchanging knowledge and experience for improving occupational radiation protection in industrial radiography.



### What are the objectives of ISEMIR-IR?

- to facilitate the implementation of ALARA practices and effective exposure management
- to provide efficient collection and maintenance of data on occupational exposure, radiation practices and incidents
- to allow non-destructive testing (NDT) companies to benchmark their own facility and individual radiographers' performances against global or regional data
- to define follow-up actions to address identified gaps and disseminate lessons learnt
- to contribute to minimizing the likelihood of accidents, e.g. by identifying pre-cursors, user feedback and experience



## How was ISEMIR-IR developed?

The ISEMIR project was initiated by the IAEA in January 2009 to focus on very specific topical areas where occupational radiation protection for the workers is not trivial and faces unresolved issues and gaps.

The ISEMIR is coordinated by the IAEA assisted by an [Advisory Group](#) with representatives of international organisations such as UNSCEAR, EC, NEA/OECD as well as the five main world regions. The Advisory Group identified two specific areas in radiation use, where non-trivial occupational exposures occur, interventional cardiology and industrial radiography. For each of these 2 topical areas a working group was set up with experts covering the respective area in a comprehensive way with respect to professions, type of radiation usages, geographical regions and other factors.



## What was the role of the ISEMIR Working Group on Industrial Radiography?

ISEMIR Working Group on Industrial Radiography's (WGIR) main task was to draw an overview picture of the situation concerning occupational exposures and radiation protection of staff in IR all over the world.

The WGIR was comprised of professionals with experience of working for NDT companies, client companies, NDT societies, technical service organizations, including education, training and inspection, and regulatory bodies.

As a part of its actions, WGIR performed a [worldwide survey](#) of occupational radiation protection in IR over a period of about one year, from mid-2010 to mid-2011. Responses were received from 432 industrial radiographers, 95 NDT companies, and 59 regulatory bodies. The data collected were able to demonstrate:

- a clear need for worldwide improved optimization of occupational radiation protection in IR
- an ability to compare doses for specific occupational roles and conditions, and to assess the impact of radiation protection actions, and to follow dose trends

Read more about the survey in [IAEA TEC-DOC 1747](#).

As a result, WGIR has proposed to the Advisory Group and IAEA [to set up an international database to be used as a tool for optimization of occupational radiation protection](#).

## Benefits of participation in ISEMIR-IR

The participation is free of charge and many parts of the data entry are voluntary in order to make it accessible to all interested parties. Each participating NDT company will be able to provide annual information about company, including the sources used, company procedures, training related to radiation protection, and individual industrial radiographers in the company.

As an outcome of the data entry, NDT company will be able to review its assessment of the effectiveness of the optimization of radiation protection. The metric is determined by occupational dose per radiographic exposure for a given industrial radiographer. See the flowchart below:

The international database will support three broad types of analyses:

- occupational doses per radiographic exposure for a given industrial radiographer as a function of personnel and facility attributes
- benchmarking
- trends with time (per radiographic exposure over successive years).

NDT facilities will benefit from using ISEMIR-IR by benchmarking their own company and individual personnel performances against global or regional data and identifying areas for improvement and corrective actions that should lead to an improvement in radiation protection.

Until the full completion of all ISEMIR-IR features, the annual reports can be accessed at [ORPNET](#) website. The NDT companies can perform their benchmarking offline.

### Characterizing the circumstances of occupational exposure arising from Industrial Radiography.

#### NDT Company's attributes:

- Preventive maintenance
- Inspection
- Investigation levels
- Source activities

#### Individual's attributes:

- Professional training
- Role
- Radiation sources used
- Types of work site
- Radiation protection training
- Radiation protection habits
- Radiation incidents

(Not functional yet)



#### Individual's metric: Dose per radiographic exposure

- Workload
  - Doses
- (Not functional yet)

## How to register for participating in ISEMIR-IR

The ISEMIR-IR database is based around individual NDT companies. Each NDT company has a point of contact – the Company Coordinator (CC) – this person is responsible for entering the company's data. In order to gain access to ISEMIR-IR:

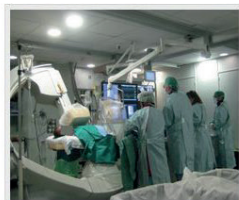
- The Company Coordinator (CC) should first register with NUCLEUS, a common access point to about 130 IAEA's scientific, technical and regulatory information resources <http://nucleus.iaea.org/>
- He/she needs to confirm the email link received after the registration
- Once his/her IAEA Nucleus account is activated, the CC should return to ISEMIR <https://nucleus.iaea.org/isemir/>

### Welcome to ISEMIR

ISEMIR is the IAEA Information System on Occupational Exposure in Medicine, Industry and Research.

#### Medicine (ISEMIR-IC)

Medical facilities to improve their occupational radiation protection.



#### ISEMIR Industrial Radiography (ISEMIR-IR)

Enter ISEMIR-IR ►

ISEMIR IR - a tool for non-destructive testing companies carrying out industrial radiography to improve implementation of optimization of occupational radiation protection.



- In order to participate in ISEMIR-IR, the CC should enter ISEMIR-IR

#### ISEMIR INDUSTRIAL RADIOGRAPHY (ISEMIR IR)



### ISEMIR-IR – a tool for non-destructive testing companies carrying out industrial radiography.


ISEMIR-IR is developed as a web-based tool for data collection. It assists IR facilities in benchmarking their arrangements in radiation protection and safety, and hence in promoting of, implementation of optimization of occupational radiation protection.

[What is ISEMIR-IR?](#) | [User Guide](#) | [TECDOC](#)

If the CC is already registered with Nucleus, he/she can simply sign in using the existing user name and password.

After registration, the CC needs to fill in the profile and company information.

IAEA NUCLEUS

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### My User Profile

\* Required Information

Nucleus Login:	
First Name:	
Last Name:	
Phone Number:	
User Role(s):	<ul style="list-style-type: none"><li>• ISEMIRIR Company Coordinator</li></ul>
Job Title*:	<input type="text"/>

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### Edit Company

\* Required Information

#### Company Information

Name*:	<input type="text" value="Test"/>
Street Address 1:	<input type="text"/>
Street Address 2:	<input type="text"/>
City*:	<input type="text" value="Vienna"/>
Post Code:	<input type="text"/>
Country*:	<input type="text" value="Austria"/>
Phone Number:	<input type="text"/>


#### RPO Information

RPO Name:	<input type="text"/>
RPO Email Address:	<input type="text"/>
RPO Phone Number:	<input type="text"/>

Data for each NDT company is entered per calendar year. The data entry may be progressive, occurring at various times during the year until complete, or it may be entered all at once.

In order to enter the data, the CC first needs to select the particular year for the data entry.

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### Annual Collections

Search Annual Collections

Company:  Year:



**No Data**

Data collection for year 2013 has not been started for this facility.

[Start Data Collection](#)

The following datasets should be filled in:

1. Radiography Sources
2. Radiography Procedures
3. Number of Workers in Dose Ranges
4. Company Events

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### Annual Collections

Search Annual Collections

Company: Test Year: 2011

Test (2011) - In Progress

Type of dataset	Summary
Radiography Sources	Input Data Radiography Sources (No data for radiography sources exists)
Radiography Procedures	Radiography Procedures' data not inputted.
Number of Workers In Dose Ranges	Number of workers in dose ranges' data not inputted.
Company Events	Company events' data not inputted.

Comments

1. The CC can input the number of sources and x-ray units, and identify the source's Typical Initial Activity and Typical End of Use Activity for Iridium 192, Selenium 75, and Cobalt 60. In addition, the CC can add any custom source owned by the company.

*Radioactive Source	Number of Sources	Typical Initial Activity			Typical End Of Use Activity		
		Value	Unit	Converted Value	Value	Unit	Converted Value
<sup>192</sup> Ir	0	0			0		
<sup>75</sup> Se	0	0			0		
<sup>60</sup> Co	0	0			0		

\*Click the 'Edit' link for a radioactive source in order to input data about that radioactive source.

*Radiation Generator	Number of Units	Typical kV	Typical mA	Action
X-ray Units	0	0	0	

\*Click the 'Edit' link for a radiation generator in order to input data about that radiation generator.

2. The section Radiography procedures captures the company investigation levels, information about maintenance and company's own compliance inspections.

Are there company investigation levels for occupational exposure*:	<input type="radio"/> Yes <input type="radio"/> No
If yes, what is the investigation level (in mSv) per month?:	<input type="text"/>
Interval between preventative maintenance for gamma radiography exposure devices (in number of months):	<input type="text"/>
Interval between preventative maintenance for X-ray equipment (in number of months):	<input type="text"/>
Does your company perform its own compliance inspections of its radiographers?)*:	<input type="radio"/> Yes <input type="radio"/> No
If yes, approximately how many times per year would a radiographer be inspected by your Company?)*:	<input type="text"/>

3. The CC should fill the number of workers in the particular NDT company and their annual dose received, expressed in millisieverts (mSv). No personal information about the employees is required. The CC can choose annual dose in a range, lower than the minimum detectable level up to 50 mSv.

In addition, the CC should provide the mandatory information on a number of occupationally exposed workers, annual collective dose received and the minimum detectable level in the NDT company.

### Collective Dose Information






Number of Occupationally Exposed Workers*:	<input type="text" value="0"/>	<a href="#">?</a>
Annual Collective Dose (in man.mSv/year)*:	<input type="text" value="0"/>	<a href="#">?</a>
Minimum Detectable Level (in mSv)*:	<input type="text" value="0"/>	<a href="#">?</a>

### Number of Workers in Dose Ranges

Annual Dose < min detectable level:	<input type="text"/>	<a href="#">?</a>
min detectable level ≤ Annual Dose < 1 mSv:	<input type="text"/>	<a href="#">?</a>
1 mSv ≤ Annual Dose < 5 mSv:	<input type="text"/>	<a href="#">?</a>
5 mSv ≤ Annual Dose < 10 mSv:	<input type="text"/>	<a href="#">?</a>
10 mSv ≤ Annual Dose < 15 mSv:	<input type="text"/>	<a href="#">?</a>
15 mSv ≤ Annual Dose < 20 mSv:	<input type="text"/>	<a href="#">?</a>
20 mSv ≤ Annual Dose < 30 mSv:	<input type="text"/>	<a href="#">?</a>
30 mSv ≤ Annual Dose < 50 mSv:	<input type="text"/>	<a href="#">?</a>
50 mSv ≤ Annual Dose:	<input type="text"/>	<a href="#">?</a>



4. This section focuses on entering information about accidents, misses with doses and any deviations from normal.

Number of accidents with doses $\leq$ 20mSv*:	<input type="text" value="0"/>	
Number of accidents with doses $>$ 20mSv*:	<input type="text" value="0"/>	
Number of near misses with doses $\leq$ 20mSv*:	<input type="text" value="0"/>	
Number of near misses with doses $>$ 20mSv*:	<input type="text" value="0"/>	
Number of deviations from normal:	<input type="text"/>	

Once the data entry for a given year is completed, the dataset can be submitted. When the submitted data has been reviewed and there are no issues or queries, the data will be published and become part of the ISEMIR-IR database, available for analysis and benchmarking.

The analysis is not yet automatized, therefore once the ISEMIR-IR database becomes populated with data from NDT companies for the particular year, analyses will be performed by the ISEMIR-IR Administrator and the results will be made available to the NDT companies (in the application itself as well as on the [ORPNET](#) website).

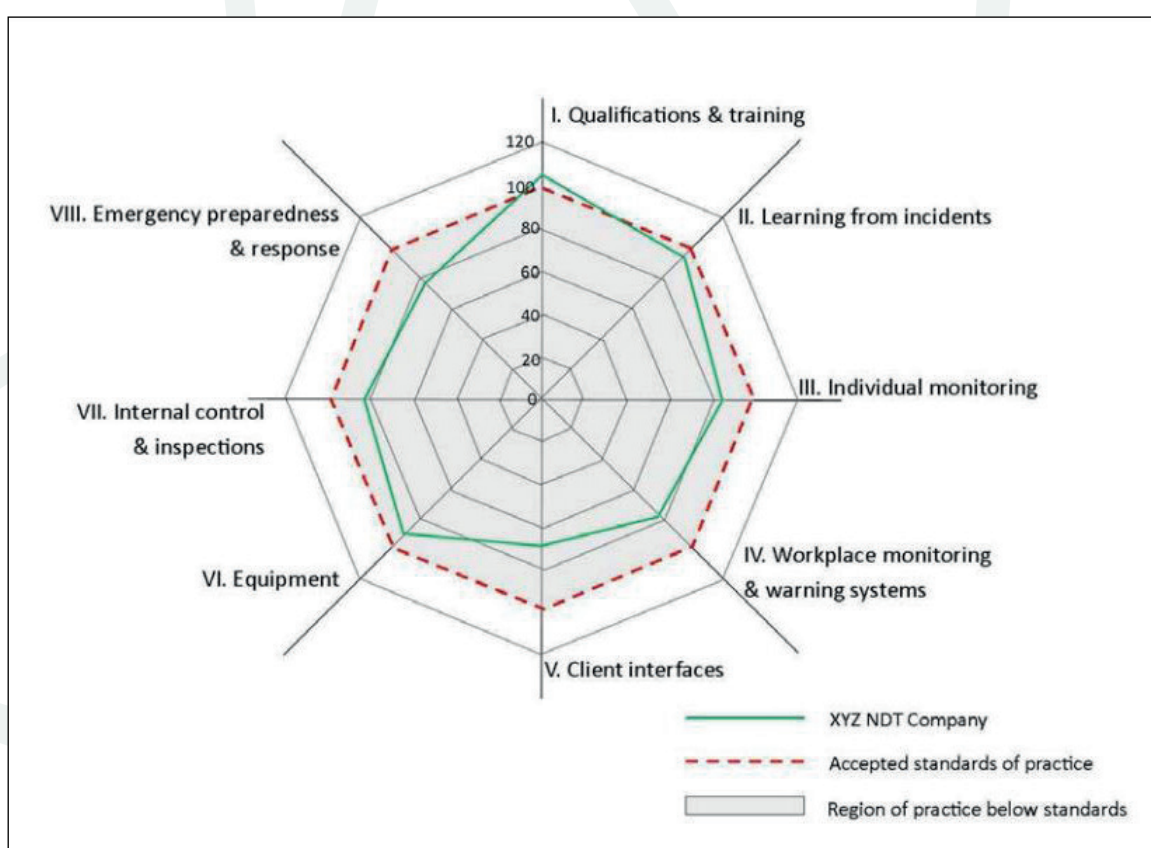
### Confidentiality

Individuals and facilities are anonymised in the database. IAEA cannot and does not reveal the identity of the relevant company, and all submitted personal or company data are considered to be confidential and will not be shared.

The published analysis will be generic and will not refer to a specific company but will rather be based on a regional division.

## Further development and the Road Map Tool

The “road map” is a software tool that enables the NDT companies to online assess their own performance in radiation protection against accepted practice. A NDT company answers the questions in the road map, based on a current practice in their company. The response to each question is then scored by comparing it with good practice measures. Different weightings are applied to questions, depending on their relative importance. The scores are summed and the results presented to the user, including a graphical schematic that gives a quick visual overview of how the NDT company compares with current good practices. Areas that have been identified as being below par could then be addressed by the NDT company to improve occupational radiation protection in their facility.



The ISEMIR-IR database is being developed in stages, as resources permit.

NDT facilities all around the world are encouraged to actively participate in the database and report their company data. The ISEMIR-IR has currently offline reporting ability, the general reports based on the industry or region will be shared online, at ORPNET website.

ISEMIR-IR is a viable tool for implementing optimization of occupational radiation protection for individual NDT companies.

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