



IAEA

International Atomic Energy Agency
Atoms for Peace and Development



IAEA

Information System on
Occupational Exposure in
Medicine, Industry and Research

ISEMIR



IAEA

Occupational
Radiation Protection
Appraisal Service

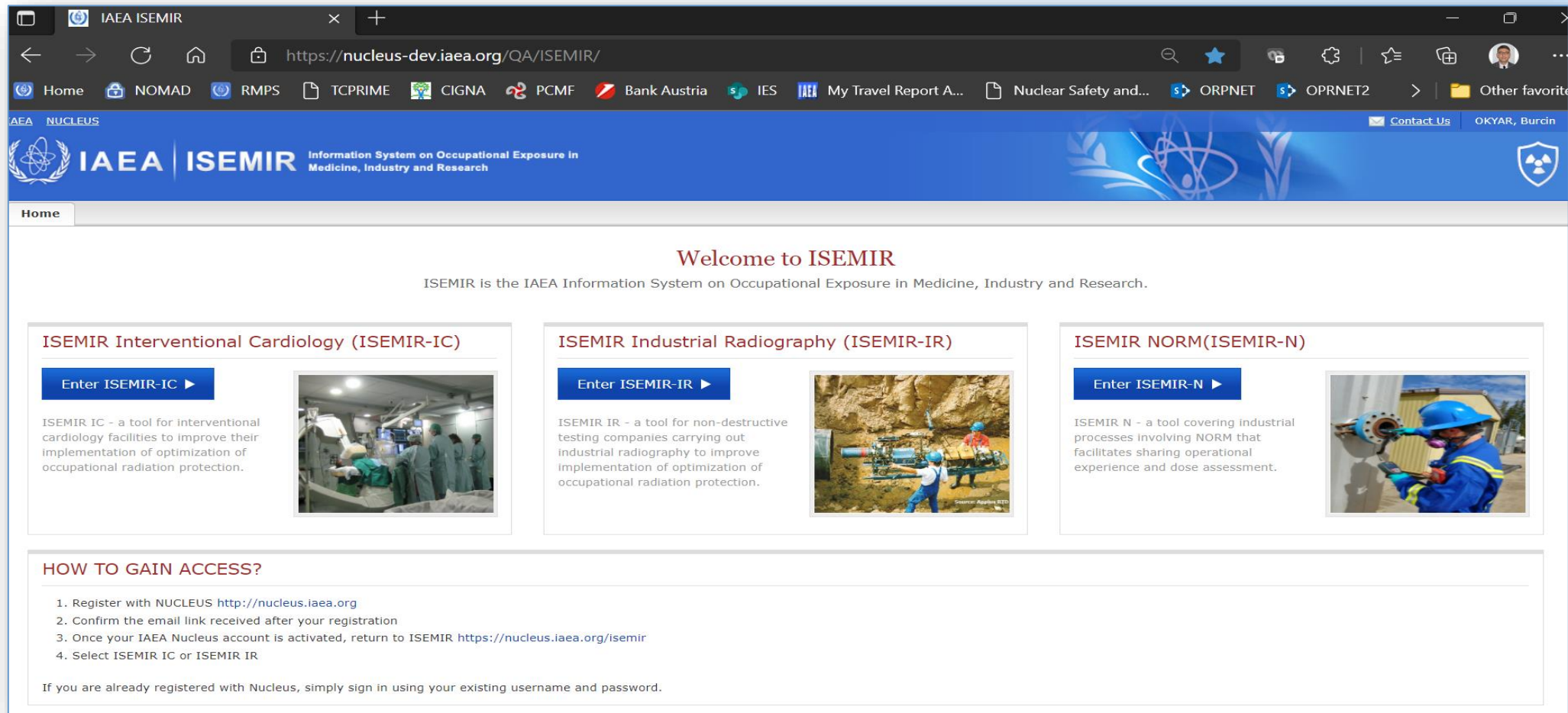
ORPAS

H. Burçin Okyar

Occupational Radiation Protection Unit

Radiation Safety & Monitoring Section NSRW

Information Exchange System



The screenshot shows a web browser window with the URL <https://nucleus-dev.iaea.org/QA/ISEMIR/>. The browser's address bar and tabs are visible. The website's header features the IAEA logo and the text "IAEA ISEMIR Information System on Occupational Exposure in Medicine, Industry and Research". Below the header, a "Home" tab is selected. The main content area is titled "Welcome to ISEMIR" and includes a description: "ISEMIR is the IAEA Information System on Occupational Exposure in Medicine, Industry and Research." Three main sections are displayed: "ISEMIR Interventional Cardiology (ISEMIR-IC)", "ISEMIR Industrial Radiography (ISEMIR-IR)", and "ISEMIR NORM (ISEMIR-N)". Each section has a blue button labeled "Enter ISEMIR-IC", "Enter ISEMIR-IR", and "Enter ISEMIR-N" respectively, followed by a brief description and a representative image. At the bottom, a section titled "HOW TO GAIN ACCESS?" provides a four-step registration process and a note for existing users.

ISEMIR Interventional Cardiology (ISEMIR-IC)

Enter ISEMIR-IC ▶

ISEMIR IC - a tool for interventional cardiology facilities to improve their implementation of optimization of 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.

ISEMIR NORM (ISEMIR-N)

Enter ISEMIR-N ▶

ISEMIR N - a tool covering industrial processes involving NORM that facilitates sharing operational experience and dose assessment.

HOW TO GAIN ACCESS?

1. Register with NUCLEUS <http://nucleus.iaea.org>
2. Confirm the email link received after your registration
3. Once your IAEA Nucleus account is activated, return to ISEMIR <https://nucleus.iaea.org/isemir>
4. Select ISEMIR IC or ISEMIR IR

If you are already registered with Nucleus, simply sign in using your existing username and password.

[IAEA ISEMIR](#)

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



- Tool for optimization of occupational radiation protection
- Online web-based information system
- 3 specific topical areas:



**1. Industrial
radiography
ISEMIR IR**



**2. Interventional
cardiology
ISEMIR IC**



**3. NORM Industrial
processes
ISEMIR N**

- Primary for **end users / operators**— staff and management from:
 1. Non-destructive testing (NDT) companies carrying out industrial radiography
 2. Medical facilities carrying out interventional cardiology procedures\
 3. Industrial operators, processes involving NORM
 4. Participation is free
 - To improve ORP in the medical facilities, NDT companies and NORM industrial processes
 - To provide for efficient collection and maintenance of data on occupational exposure and radiation practices
 - To analyze the trends of occupational doses of individuals, facilities/companies against global or regional data
 - To identify good practices as well as gaps
 - To define follow-up actions to address identified gaps and disseminate lessons learnt

Benefits

Industrial Radiography

Using radiation to test structures for faults or defects is a common technique used for testing internal structure of for example welds or pipelines.

Challenge:

- The work is carried out under difficult working conditions – remote sites, inhospitable areas, little supervision, use of strong gamma sources, long subsequent day and/or night shifts.



Interventional Cardiology

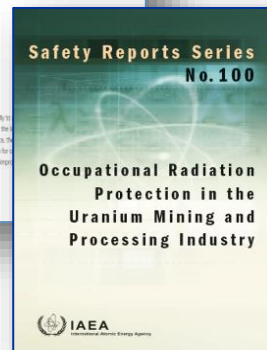
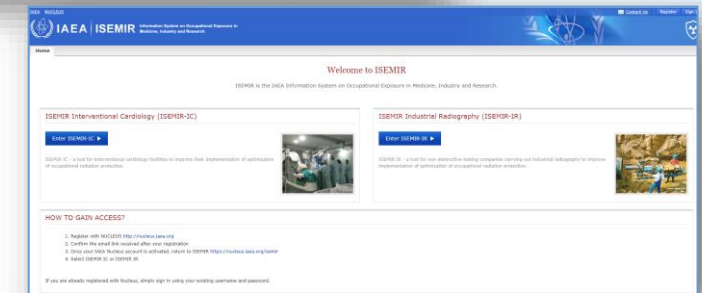
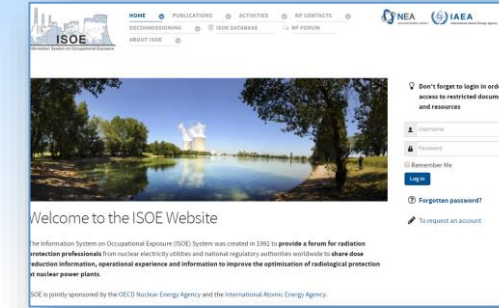
The use of image guided interventional procedures in cardiology has increased in the last three decades, bringing great benefit to millions of patients around the world.

Challenge:

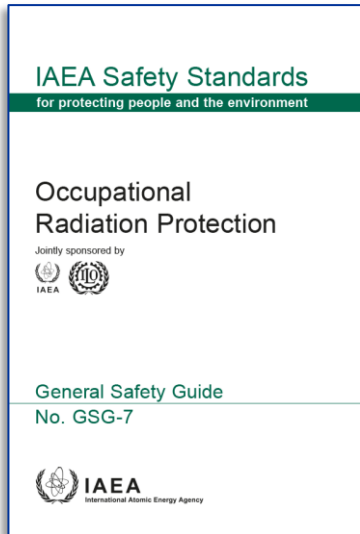
- These procedures can involve large patient radiation doses and require health professionals to be present in the room alongside the patient when radiation is being used.

ISEMIR

- For nuclear industry workers there are a number of databases of occupational doses at both international and national level (Information System on Occupational Exposure, **ISOE**)
 - <http://www.isoe-network.net/>
- Similar systems have been developed for medical and industrial facilities and activities for RP of workers (**ISEMIR**)
 - Industrial radiography (ISEMIR IR)
 - Interventional cardiology (ISEMIR IC)
 - <https://nucleus.iaea.org/sites/orpnet/worldwide/isemir/SitePages/Home.aspx>
- After the establishment of NORM module, the next step will be research
- The Information System for Uranium Mining Exposures (**UMEX**), designed to examine global occupational exposures in uranium mining and processing
 - <https://nucleus.iaea.org/sites/orpnet/worldwide/umex/SitePages/Home.aspx>
- **ESOREX** Platform- European Platform for Occupational Radiation Exposure
 - <https://esorex-platform.org/>



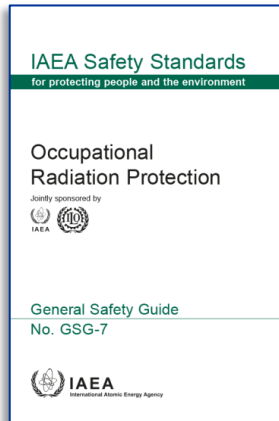
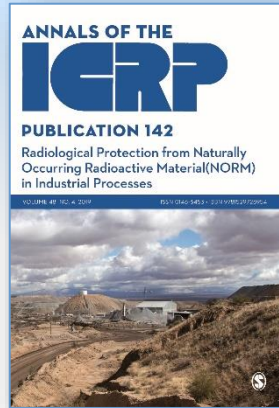
Safety Guide on ORP (GSG-7)



- Monitoring programme conducted in the relevant workplace (as with other occupational exposures) is the only reliable way of assessing the effective dose received by a worker exposed to NORM
 - Reasonable knowledge of the characteristics of the material and the work situation in which the material is used (for exposure to gamma radiation and exposure due to airborne dust, it is possible to establish in advance)
- Dose is quite strongly influenced by the activity concentrations of radionuclides in the material, reflecting the underlying linear relationship between these two parameters.
- Broad indication of the dose from exposure to gamma radiation and exposure due to airborne dust can be used during the prior radiological evaluation
 - Prioritization tool to identify, on the basis of activity concentrations in process materials,
 - Types of industrial process and scenarios of exposure
- Dose assessment is the key

ISEMIR-N, Background

- **Very large numbers of workers** in the world may be exposed to NORM
 - Based on some NDRs, the data are more limited than those for occupational exposures to man-made sources
- The annual collective effective dose has been estimated to be approximately twice as large for some industries (e.g., U/Th mining and processing, minerals production, rare earth extraction, etc.)
 - The quantities of NORM, and hence the resulting exposures to workers, differ widely from field to field.
- **Lack of real data (as opposed to theoretical assessment) regarding actual exposure of workers in NORM activities – especially regarding internal exposure**
 - ORP data is the key for decision making (current approach; data from literature or with a survey)
- **Occupational exposure control is the backbone for any regulatory regime and most countries have not been particularly concerned with assessing occupational exposure to NORM (and data is limited for some industries)**



ISEMIR-N, Requirements (design)

- Important requirements and information to collect:
 - Capture as many of the NORM workers as possible across a wide number of jurisdictions
 - Need to know the type of operation and nature of the work being performed
 - Need to understand the key assumptions used to monitor and calculate exposure and dose
 - Collect dose information based on individual pathways
 - Ideally wish to know the underlying dose distribution
 - Record primary control mechanisms to optimise dose
- Current System of NORM worker doses:
 - Some countries have central dose registers
 - Dose data may be held by multiple bodies across different jurisdictions
 - High variability in how doses are monitored and calculated
 - High variability in how workers are classified

ISEMIR-N, the structure

- Data merging and structure data entry
- Covers the following key areas:
 - **Background information**
 - **Operation information**
 - **Monitoring approach**
 - **Dose calculation**
 - **Radiation controls**
 - **Auxiliary controls**
 - **Workgroup dose data**

Corporate Information

Country
State
Organisation Name
Address
Contact Details
Person completing
Position
Email contact
Phone contact

Operation information

Operation Name
Location
Product Produced
Type of Mining
Processing Methodology
Processing Methodology
Cause of Occupational Exposure
Radionuclide of Concern
Cause of Occupational Exposure
Radionuclide of Concern
Production
Operational stage
Environment
Staff Numbers
Occupationally exposed workers
Occupationally exposed contractors not already included
in above
Non-designated workers
Total

Monitoring Approach

External Exposure - Gamma

- Monitoring Approach
- Minimum Detectable Level
- Monitoring Methodology
- Background subtracted

Inhalation of Radon Decay Products (RDP)

- Monitoring Approach**
- Minimum Detectable Level
- Monitoring Methodology
- Background subtracted

Long Lived Radioactive Dust (LLRD)

- Monitoring Approach
- Method for determining radioactivity
- Minimum Detectable Level
- Radon retention in sample if appropriate
- Monitoring Methodology
- Background subtracted
- Biological monitoring/Internal Dosimetry

Dose Calculation

Occupancy time

External Exposure - Gamma

Conversion factor if used

Inhalation of Radon Decay Products (RDP)

Determination of RDP directly or equilibrium factor

Particle sizing of RDP if used

Long Lived Radioactive Dust (LLRD)

Particle size

Solubility factor

Respiratory Protection Factor used for PPE



A

Radiation Controls

External Exposure - Gamma

Mining controls (select major controls)

Processing controls (select major controls)

Inhalation of Radon Decay Products (RDP)

Mining controls (select major controls)

Processing controls (select major controls)

Long Lived Radioactive Dust (LLRD)

Mining controls (select major controls)

Processing controls (select major controls)

Special Controls in the Event of an Incident

Mining controls/actions (select major controls)

Processing controls/actions (select major controls)

Auxiliary Controls

Radiation induction

Radiation Training

Designated vs non-designated

Supervised and controlled areas

Contamination controls

QA systems

Record keeping

Radiation Staffing

Emergency Response Plan

Restricted release Zones

ISEMIR, gateway Nucleus account



ISEMIR – National Contact Point



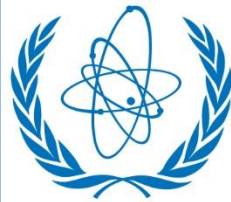
- Designated individual from Member States (official)
- Contact points for IC and IR
- Same contact for ISEMIR-N, to disseminate the platform and promotion
 - **ISEMIR-N contact point**
 - isemir-n.contact-point@iaea.org



IAEA

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Atoms for Peace and Development

Review mission in the field of Radiation Protection of Workers



IAEA

Occupational
Radiation Protection
Appraisal Service

ORPAS

Review Services



International Atomic Energy Agency

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Review missions and advisory services

Review missions

- > Integrated Regulatory Review Service (IRRS)
- > Integrated Nuclear Infrastructure Review (INIR)
- > Advisory Mission on Regulatory Infrastructure for Radiation Safety (AMRAS)
- > State Systems of Accounting for and Control of Nuclear Material mission (ISSAS)
- > Construction Readiness Review (CORR)
- > Independent Engineering Review of I&C Systems (IERICS)
- > Uranium Production Site Appraisal Team (UPSAT) review mission
- > Operational Safety Review Team (OSART)
- > Emergency Preparedness Review (EPREV) Service
- > Safety Aspects of Long Term Operation (SALTO)
- > International Physical

The IAEA offers its Member States a wide array of review services, in which an IAEA-led team of experts compares actual practices with IAEA standards in, for example, nuclear safety and security, energy and safeguards or the health sector.

Calendar

📅 Calendar of peer review and advisory services

Related resources

🔗 Global Nuclear Safety and Security Network: peer reviews and advisory services

News



PRESS RELEASE

3 October 2018

[IAEA Mission Sees Significant Improvements in Hungary's Regulatory Framework](#)



PRESS RELEASE

1 October 2018

[IAEA Mission Says Luxembourg Committed to Safe Management of Radioactive Waste, Sees Areas for Further Enhancement](#)



PRESS RELEASE



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[Home](#) / [Services](#) / [Review missions and advisory services](#) / [Occupational Radiation Protection Appraisals \(ORPAS\)](#)



Occupational Radiation Protection Appraisals (ORPAS)

Occupational Radiation Protection Appraisals (ORPAS)

> [News](#)

ORPAS missions are conducted as an independent appraisal service in the field of radiation protection of workers. Such an appraisal is an opportunity for a Member State to have all or some aspects of its occupational radiation protection programme independently assessed and evaluated against international safety standards.

While each Member State is responsible for the radiation safety of occupational radiation protection, the appraisal service is provided by the IAEA at the request of a Member State. The purpose of the assessment is to check the legislative and regulatory infrastructure and practical implementation of a state's occupational radiation protection programme.

ORPAS is appropriate for all types of facilities and activities. It also covers technical and scientific support services or organisations for protection and safety in respect to the assessment of occupational exposure from external sources of radiation and due to the intake of radionuclides. It includes individual monitoring, as well as workplace monitoring, and advisory services. ORPAS promotes self-assessment, a radiation safety culture and quality systems at facilities and activities.

News

[Radiation Underground: Measuring and Controlling Miners' Exposure](#)



[IAEA Helps Panama Strengthen Occupational Radiation Protection](#)

[More news](#)

Related resources

🔗 ORPAS platform for Member States

Contact

✉ [Send an email](#)

<https://www-ns.iaea.org/reviews/default.asp?s=7&l=57>

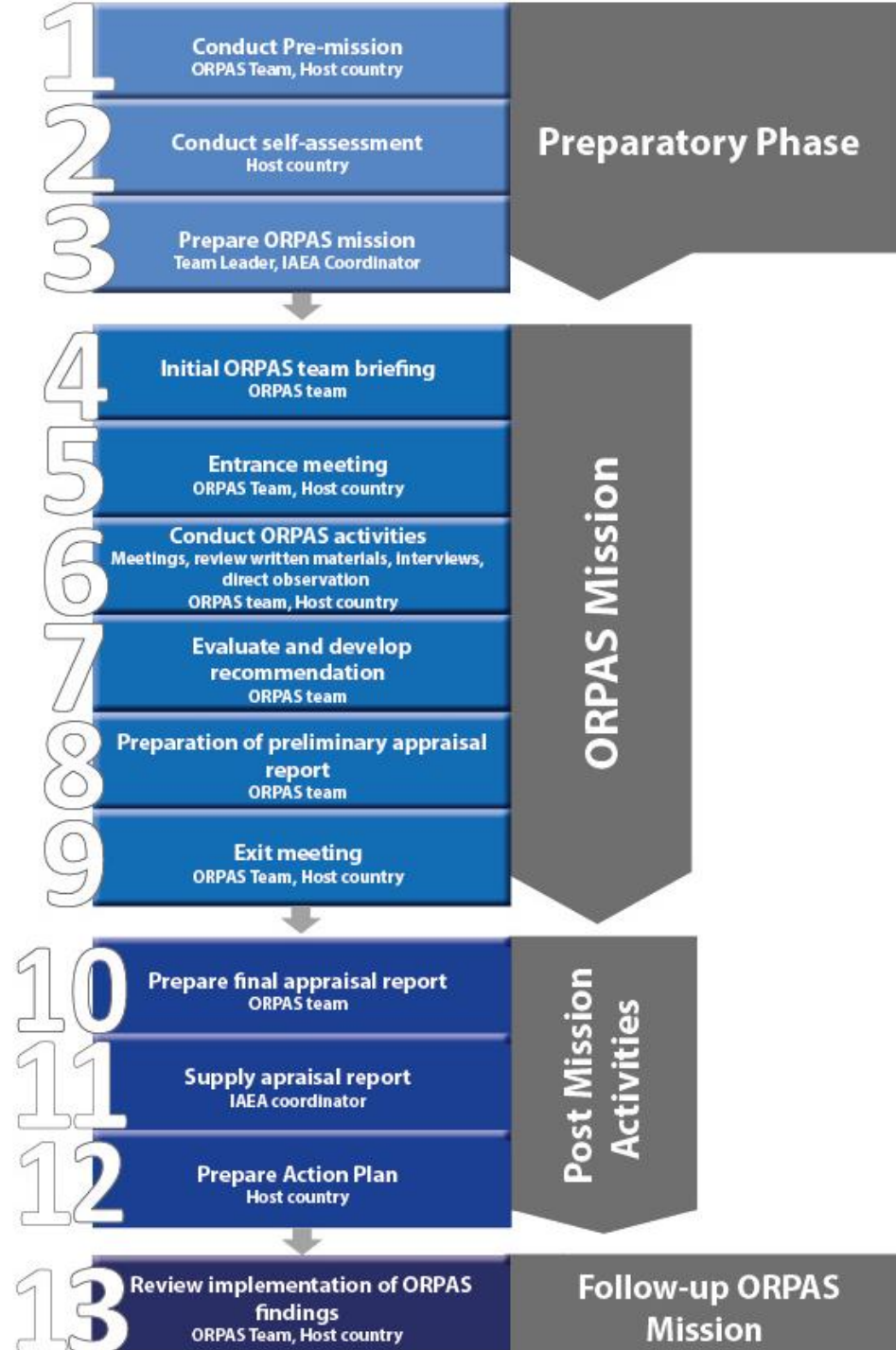
ORPAS - Independent appraisal

- ORPAS provides a cross-cutting review, against the relevant IAEA safety standards (**mainly GSR Part 3 & GSG-7 and GSR Part 1/4**), of the regulatory framework for ORP and the application of the requirements at all facilities and activities utilising radiation technologies in the host State.
- Provides an opportunity for a MS to have its ORP program independently assessed and evaluated
 - As a part of ORPAS preparation, MS is encouraged to complete the self-assessment in the form of questions (ORPAS questionnaire) tailored to the three set of participants involved in an ORPAS mission.
 - Preparation and data collection through questionnaires, Self-assessment of Regulatory Infrastructure for Safety (SARIS) (& RASIMS 2- new)



ORPAS – strategy for the missions

- The necessary **legislative and regulatory infrastructure for ORP** is in place and functioning
- **Operators** are aware of their responsibilities and have effective occupational radiation protection programmes in place and functioning, with the aim of ensuring optimized radiation protection
- **TSPs** are available and able to provide radiation protection services, in compliance with the GSR Part 3 & GSG-7 , in respect of:
 - Assessment of occupational exposure from external sources of radiation
 - Assessment of occupational exposure due to intakes of radionuclides
 - Workplace monitoring
 - Recording of occupational exposure
 - Advisory services
- All involved organizations have **management systems** in place and functioning to ensure ongoing adherence to the standards





- ORPAS: an assessment conducted by international experts selected
 - Experience in such reviews,
 - Knowledge of international guidance and best practices,
 - Ability to recognise and understand the strengths of different national systems and arrangements.



Site visits during the ORPAS mission

- Interviews and direct observations to be carried out at sites
- A site visit commences with an opening statement, including a summary of the scope of the ORPAS, the purpose of the visit and matters to be addressed
- ORPAS Team members must be accompanied by a host country counterpart
- Main goal is to have direct and face to face interactions
- Following a site visit, members discuss their findings with the others at the daily team meeting



ORPAS Team



ROLE	NAME & INSTITUTION
Team Leader	M. Hassan KHARITA Hamad Medical Corporation, Occupational Health and Safety Department
Deputy Team Leader	Vangeline K. PARAMI Licensing Review and Evaluation Section Nuclear Regulatory Division, Philippines
Team Coordinator	H. Burçin OKYAR (IAEA)
Reviewer of Regulatory arrangements	Vangeline K. PARAMI Licensing Review and Evaluation Section Nuclear Regulatory Division, Philippines H. Burçin OKYAR (IAEA)
Reviewer of Technical Support Organisations	M. Hassan KHARITA Hamad Medical Corporation, Occupational Health and Safety Department Abdul Kadir Ahmad BAZLIE Malaysian Nuclear Agency
Reviewer of Medical Facilities	Ichiro YAMAGUCHI Department of Environmental Health, National Institute of Public Health Pattama NA NAKORN Nuclear and Radiological Inspection Group III, Nuclear and Radiological Inspection Division, Office of Atoms for Peace ; Ministry of Science and Technology
Reviewer of Industrial Applications	Renato BANAGA Nuclear Services Department, Philippine Nuclear Research Institute Meherun NAHAR Bangladesh Atomic Energy Regulatory Authority
Reviewer of Industries involving NORM	Jim HONDROS Consultant, Australia Teng Iyu LIN Atomic Energy Licensing Board, Malaysia
Reviewer of Research Reactor	Tae-Young LEE Korea Atomic Energy Research Institute
Administrative Assistant	Ekaterina PANTELEYMONOVA (IAEA, Vienna based)



ORPAS Indonesia
2018

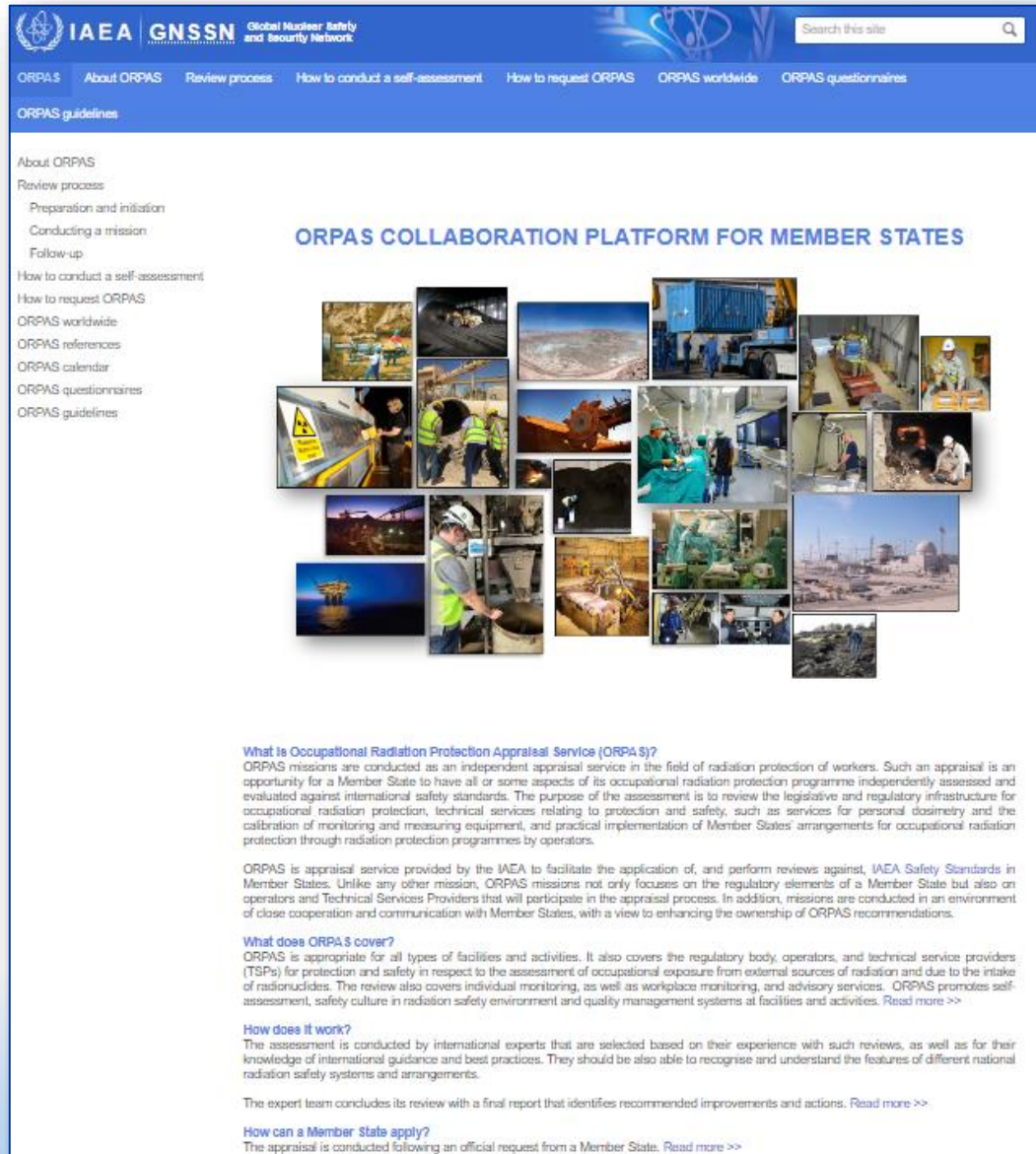
Site Visits- Interviews

PT Pertamina (Oil & Gas production site)

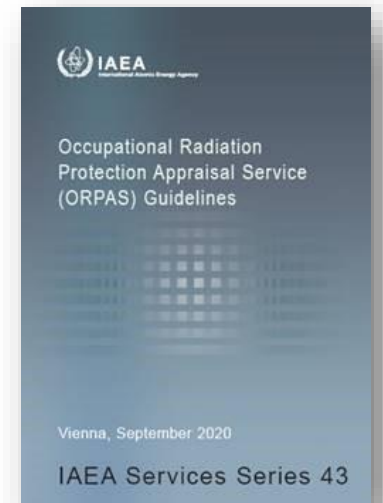
PT TIMAH (Tin mining)



ORPAS Collaboration Platform



- All necessary information
- Review process
- How to request
- How to conduct self –assessment
- Calendar
- Worldwide ORPAS
- References
- Questionnaires
- List of completed missions
- Guidelines





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Thank you

H. Burçin Okyar

Occupational Radiation Protection Unit

Radiation Safety & Monitoring Section

NSRW

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