IAEA
International Atomic Energy Agency

IAEA Safety Requirements on Dose Registries (State Registry)

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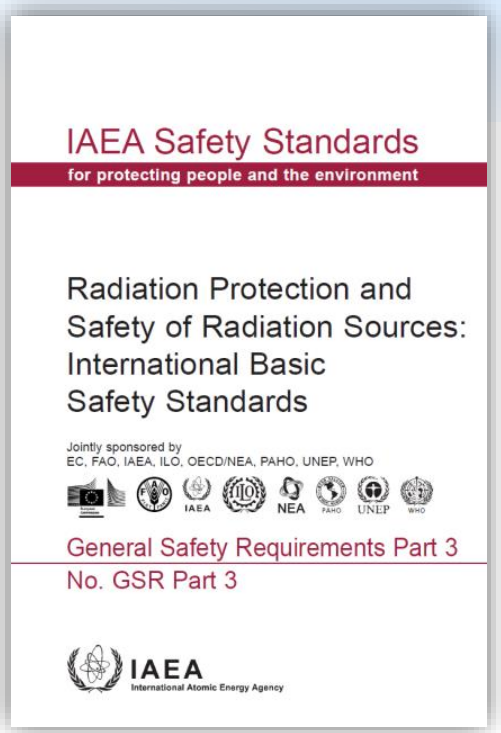
Contents

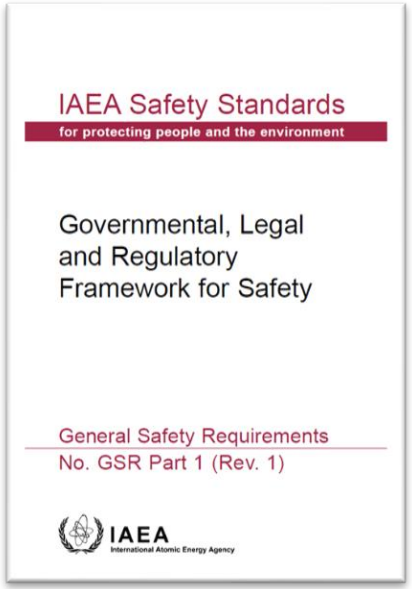
- Requirements (and guidance) in the IAEA Safety Standards on and State (national) registry (dose record keeping) based on GSR Part 1 &3 and GSG-7
- Establishment of NDRs
- The basis for implementation of an NDR
- Role of the NDR
- Occupational categories in the NDR
- Responsibility for the submission of dose records to the NDR

Occupational Exposure Assessment

- The regulatory body shall establish and enforce requirements for the monitoring and recording of occupational exposures (*authorization or approval of service providers for individual monitoring and calibration services*)
- Employers shall be responsible for making arrangements with authorized or approved dosimetry service providers that operate under a QMS for assessment of occupational exposures of workers
- Employers shall maintain records of occupational exposure for every worker for whom assessment of occupational exposure is required until the age of 75 years, and for not less than 30 years after cessation of the work



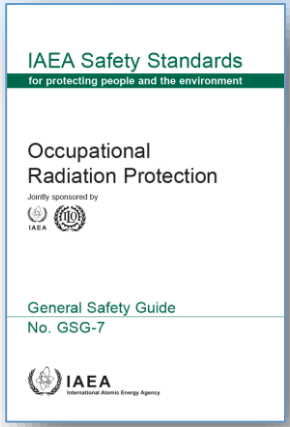
GSR Part 1 coverage for ORP
Worker protection



- **Req 7:** Safety of workers (coordination between relevant authorities)
- **Req 9:** Necessary arrangement for worker protection
- **Req 13:** Provisions of Technical Services (services for personal dosimetry, environmental monitoring and the calibration of equipment & authorization)
- **Req 25:** Graded approach for review and assessment of facilities and activities (arrangements for worker protection)
- **Req 35:** Safety related records (records of doses from occupational exposure)

Record retention periods

- *"Records of occupational exposure for each worker shall be maintained during and after the worker's working life, at least until the former worker attains or would have attained the age of 75 years, and for not less than 30 years after cessation of the work in which the worker was subject to occupational exposure."*
- Retention of the calibration records for the personal monitoring equipment used for determining such occupational exposures.
- **The RB should decide which parts of the records of occupational exposure should be maintained by the management for regulatory purposes, and it should specify retention periods for each of these parts of the records**.

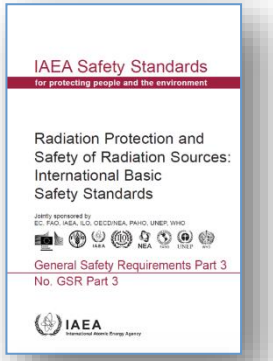


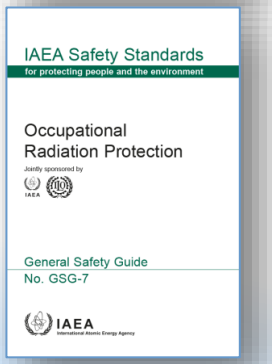
GSG-7

- Consideration should be given to the establishment of a **NATIONAL DOSE REGISTRY** as a central point for the collection and maintenance of dose records.
- The storage of information at the national dose registry should be such as to allow workers, during and after their working life, to retrieve information on the doses they received while occupationally exposed.
- Long term storage of such information in a national dose registry also serves the following purposes:
  - It prevents the loss of data on individual doses in the event that the registrant or licensee ceases its activities in the State concerned.
  - It allows periodic analysis of all data on exposures collected in order to characterize the situation at the national level with regard to occupational exposure.

Records of occupational exposure

- Records of occupational exposure are also referred to as "**exposure records**" or "*dose records*".
- **Employers, registrants and licensees** shall maintain records of occupational exposure for every worker for whom assessment of occupational exposure is required
- To be included
  - **Information on the general nature of the work** in which the worker was subject to occupational exposure;
  - **Information on dose assessments, exposures and intakes at or above the relevant recording levels specified by the regulatory body** and the data upon which the dose assessments were based;
  - When a worker is or has been exposed while in the employ of **more than one employer**, information on the dates of employment with each employer and on the doses, exposures and intakes in each such employment;
  - **Records of any assessments made of doses, exposures and intakes due to actions taken in an emergency or due to accidents or other incidents**, which shall be distinguished from assessments of doses, exposures and intakes due to normal conditions of work and which shall include references to reports of any relevant investigations.





Records of occupational exposure

- **Employer responsibilities;**
  - Provide workers with access to records of their own occupational exposure;
  - Provide the supervisor of the programme for workers' health
  - Surveillance, the regulatory body and the relevant employer with access to workers' records of occupational exposure;
  - Facilitate the provision of copies of workers' exposure records to new employers when workers change employment;
  - Make arrangements for the retention of exposure records for former workers by the employer, registrant or licensee, as appropriate;
  - Give due care and attention to maintaining the confidentiality of records.

- If employers, registrants and licensees cease to conduct activities in which workers are subject to occupational exposure, they shall make arrangements for the **retention of workers' records of occupational exposure by the regulatory body or a State registry, or by a relevant employer, registrant or licensee, as appropriate.**

Typical functions of the NDR

- **The National Dose Registry (NDR) contains the dose records of individuals who are monitored for occupational exposures to ionizing radiation.**
- **Contains personal, employment, and dosimetric data for all the radiation workers in the country.**
    - Assist national authorities in controlling and safekeeping of the occupational doses and to allow statistical evaluations (e.g., dose trends to answer requests from regulators and others)
    - Assist in regulatory control by notifying regulatory authorities of overexposures within their jurisdiction & the licensee in their respective facility
    - Contribute to health research and to the scientific knowledge on risks from occupational exposure to ionizing radiation.
    - Provide dose histories to individual workers and organizations for work planning and for compensation and litigation cases.
    - All information provided by the NDR, including dose histories, may be subject to confidentiality requirements.

National Dose Registry

- **An important tool for radiation protection on implementing the radiation protection regime at the national level:**
  - Optimization of protection
  - Dose limitation
- **A tool for :**
  - Regulatory authority(ies)
  - End users / operators
  - Workers
  - Different stakeholders

  Maintaining of life-time dose data of workers is also necessary to ensure and review radiation safety of workers, certification and other legal purposes and epidemiological studies.

National Dose Registry

- Global benchmarking on occupational radiation protection
- At the user level , technical review level, country level , & international level
- Useful tool for the global occupational exposure data survey of UNSCEAR
- Or IAEA's ISOE and ISEMIR

Records

- Management should establish a **procedure** that indicates **how monitoring data and results are to be reported, what dose levels are to be recorded and what documents and records of occupational exposure should be maintained.**
- Records of individual occupational exposure should include any **assessed equivalent doses or intakes including the dose to the skin and lens of the eye as appropriate.**
- Details of any involvement in abnormal events should be included.
- It is also important to retain records referencing the objectives, monitoring methods and models used for data analysis and interpretation.

For each monitoring period, the record should comprise

- A unique identification of the individual and the undertaking;
- The dose information for every monitoring period, i.e. for an annual period and/or for an appropriate five year period;
- The results of dose assessments for external exposure and the method of assessment, including, as appropriate:
  - The personal dose equivalent for strongly penetrating radiation, *H*p(10);
  - The personal dose equivalent for weakly penetrating radiation, *H*p(0.07);
  - Other dose values, if appropriate, such as *H*p(0.07) derived from extremity dosimeters, *H*p(3) for the lens of the eye, dose values from the use of multiple dosimeters (e.g. in the case of double dosimetry with lead apron use), dose values calculated from simulations (e.g. doses received by aircrew from cosmic radiation);

For each monitoring period, the record should comprise

- The results of dose assessments for internal exposure and method of assessment, including:
  - The committed effective dose, *E*(50);
  - The values of the measured quantity (e.g. retention or daily excretion value) and details of the models used for the assessment. Include results of whole body counting, thorax counting and/or thyroid counting and the assessed committed effective dose;
  - f appropriate (e.g. in the case of overexposure), the committed equivalent dose to the most highly exposed tissue, *H*(50);
- The notional dose substituting for missing values, artifacts or surrogates, for instance in the case of lost or damaged dosimeters or samples

Guidance

- Establishment of NDRs
- The basis for implementation of an NDR
- Role of the NDR
- Occupational categories in the NDR
- Responsibility for the submission of dose records to the NDR
- Required information and types of doses recorded by NDRs
- Special procedures for managing overexposure and/or emergency doses by NDRs
- Reporting periods for submission of data

MS’s feedback on NDR

- Nineteen focus area, including:
  - Legal requirements
  - Current status and future plan
  - Role and function
  - Operational mechanism
  - Information required
  - Information keeping and analysis

MS's feedback on NDR

Region	Countries	Institutions
Africa	40	59
America	23	27
Asia and the Pacific	31	39
Europe	43	64
Total	137	189

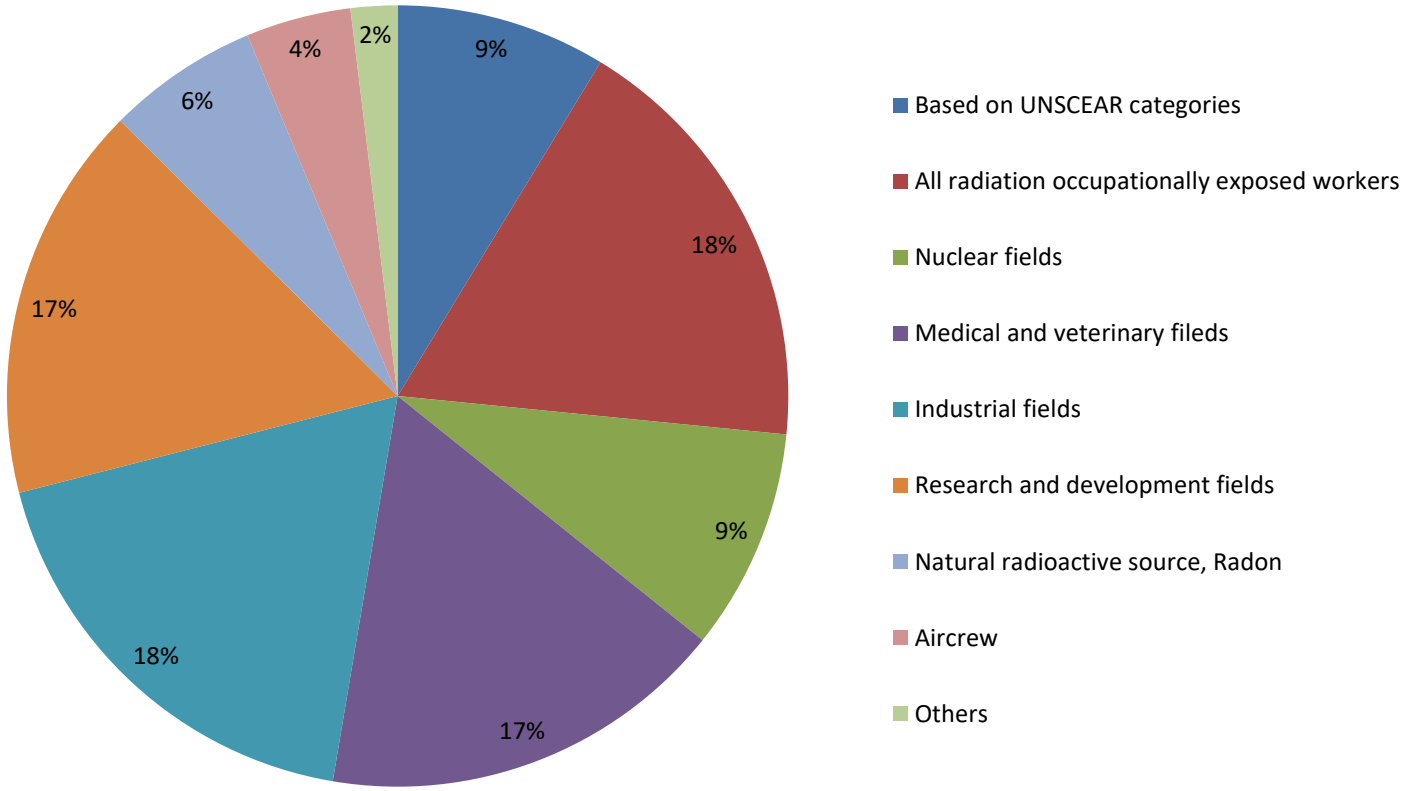
Number of received answer from participants

Region	Countries	Institutions
Africa	22	24
America	14	18
Asia and the Pacific	15	30
Europe	25	33
Total	76	105

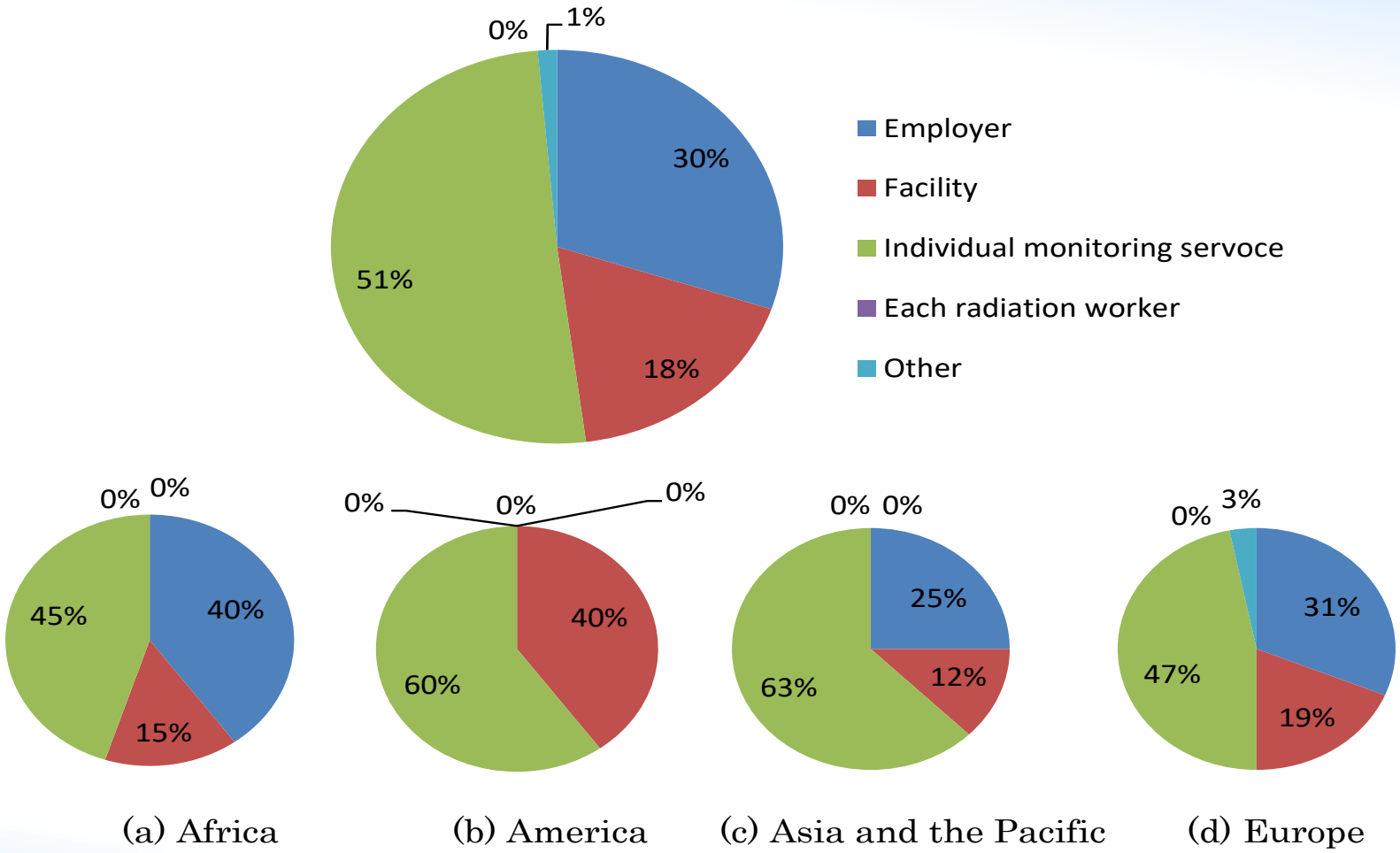
Status of establishment of the NDR

	Yes	No
Africa	14	10
America	5	9
Asia and the Pacific	13	5
Europe	24	5
Total	56	29

Occupational categories in the NDR

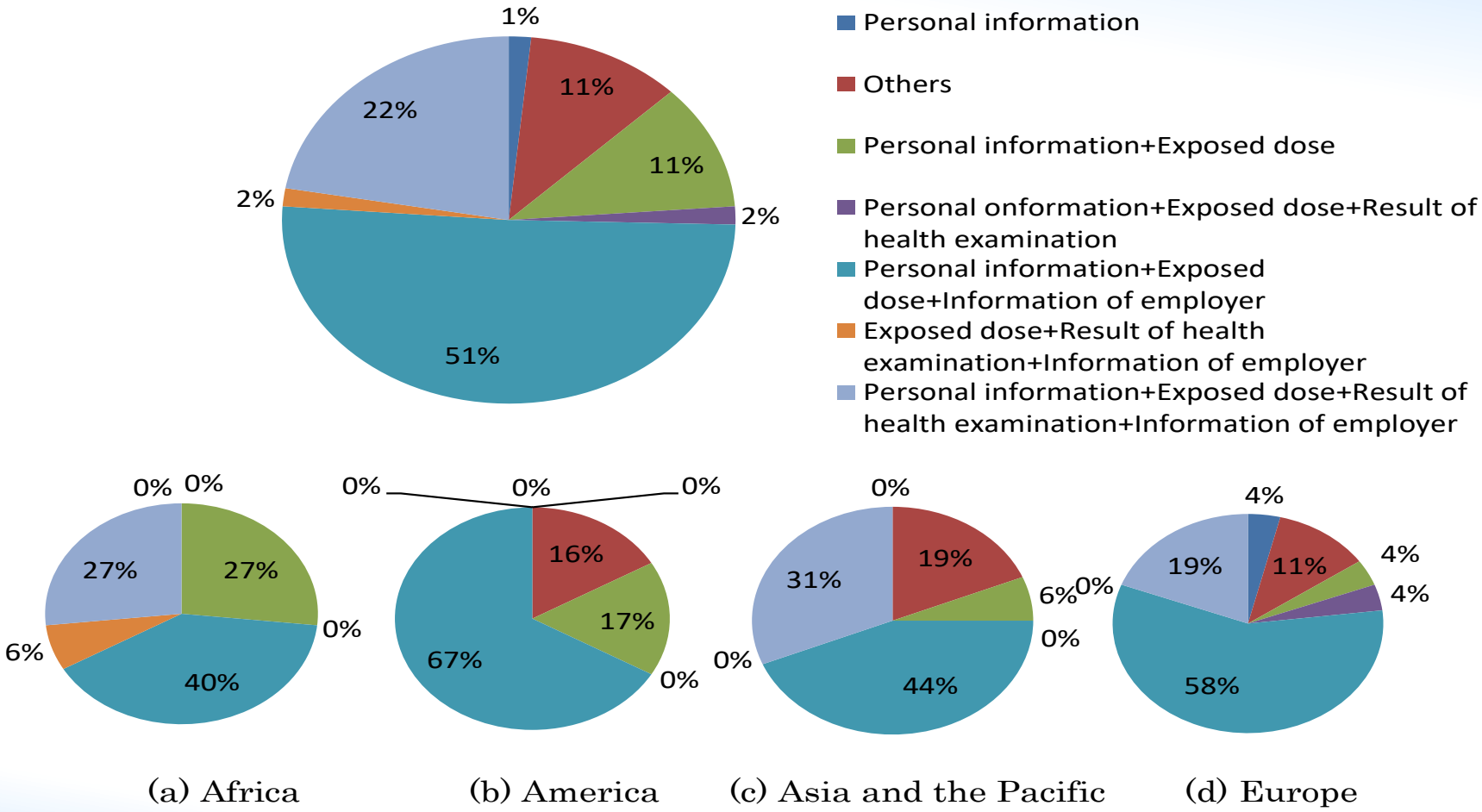


Responsibility for submission of required information to the NDR



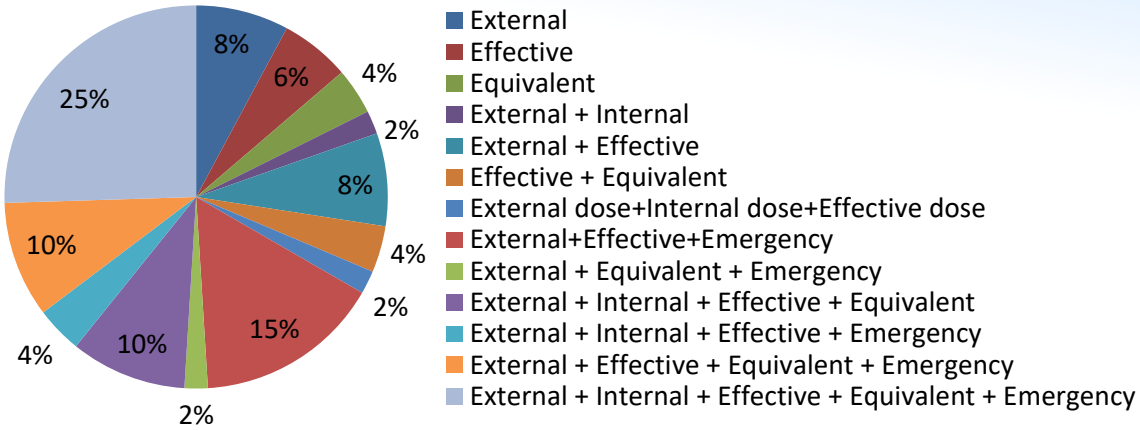
(a) Africa (b) America (c) Asia and the Pacific (d) Europe

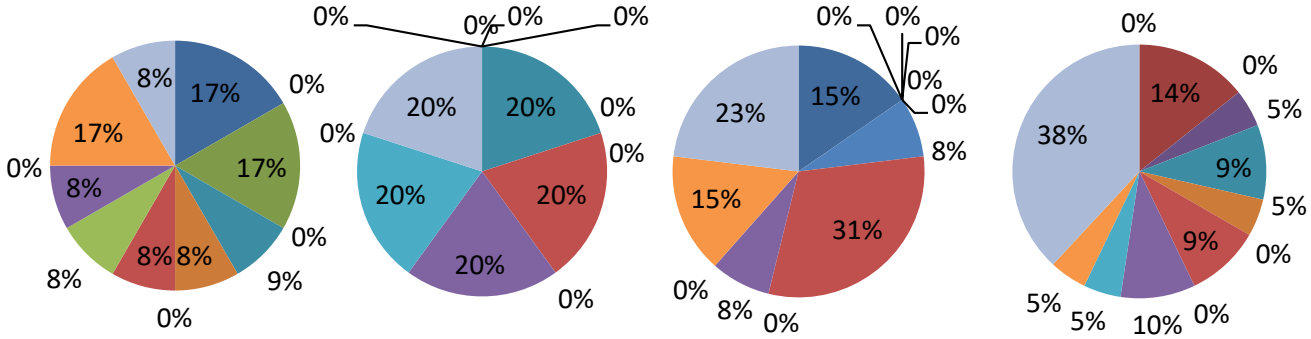
Information requested by the NDR



(a) Africa (b) America (c) Asia and the Pacific (d) Europe

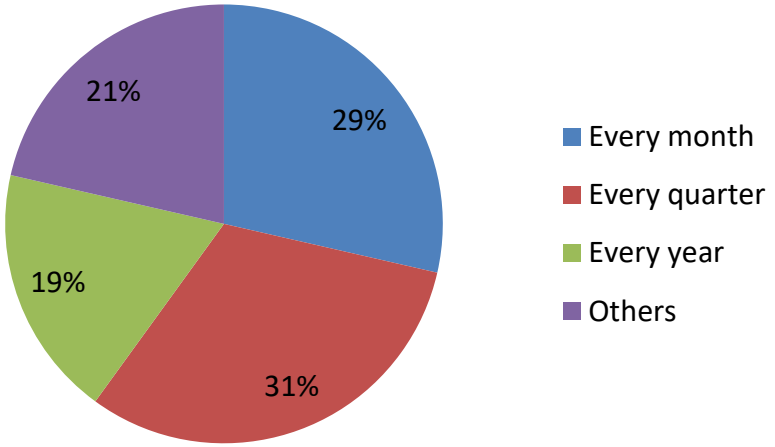
Occupational exposure recorded in the NDR

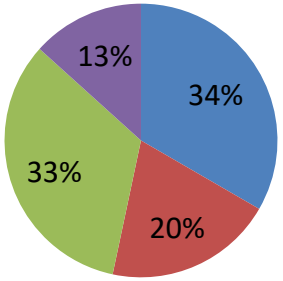




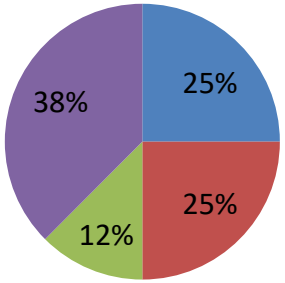
(a) Africa (b) America (c) Asia and the Pacific (d) Europe

Period for submitting data to the NDR

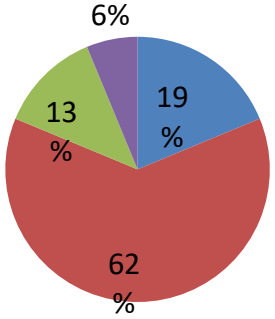




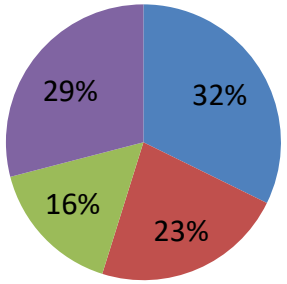
(a) Africa



(b) America



(c) Asia and the Pacific



(d) Europe

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Dose Management System for Member States

IAEA Dose Management System (DMS)

- Main purpose:
  - storage and processing of occupationally exposed workers' (OEW) data - dose values and other important parameters obtained by dosimetry techniques for monitoring occupational exposure due to external radiation and/or intake of radionuclides
  - facilitating the determination of exposure pathway
  - and fostering the policy of radiological protection

- Operated in the IAEA ISO/IEC 17025 accredited laboratory

IAEA Dose Management System (DMS)

- Covers individual monitoring of occupational exposure to external and internal sources of ionizing radiation for:
  - staff members and
  - participants in activities under the control or supervision of the IAEA
- Following the concepts developed by the International Commission on Radiological Protection (ICRP)

IAEA Dose Management System (DMS): functionalities

- DMS modules are for:
  - entering and updating employment data,
  - registering occupationally exposed workers,
  - maintaining and analyzing their doses resulting from internal and/or external exposure.
  - maintaining a group of classifiers that facilitate the user's work
  - producing reports and correlating results.

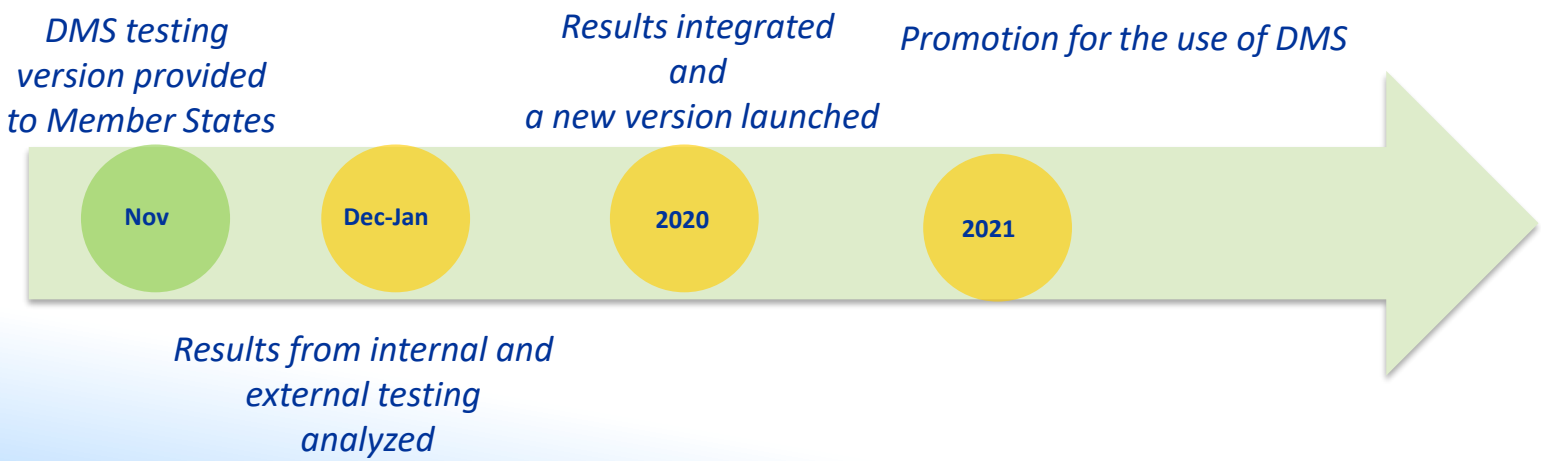
- Multiuser system with different user roles
  - Admin role
  - Administrative role
  - External monitoring users role
  - Internal monitoring users role
  - Radiation Protection Officers (RPO) role

- The DMS was developed as intranet/web-based application in the open source web framework ASP.NET using a SQL database.

Scope of the IAEA TC project: DMS for Member States

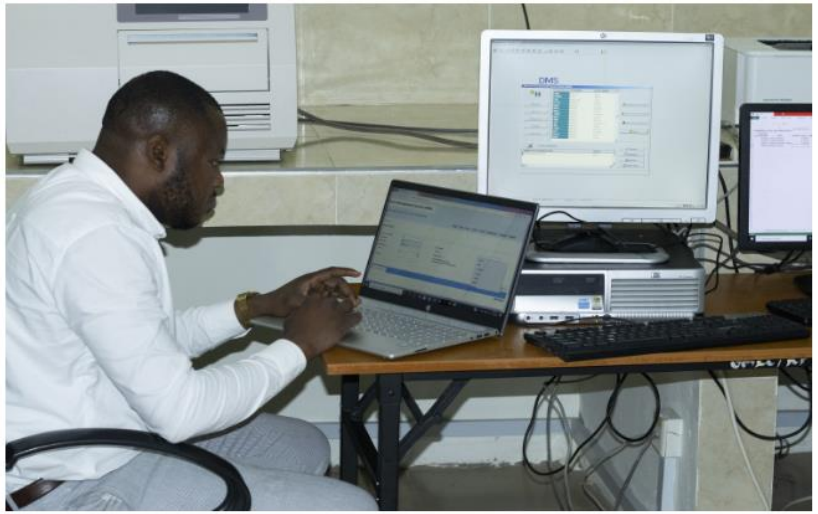
- To provide DMS as a functioning software to Member States for their own use to manage information needed by a dosimetry service including the collection, storage, evaluation and reporting of data

- To modify and transfer functionalities form the IAEA DMS specifically designed for in-house for the use by Member States
- To allow for modifications of features such as classifiers in the DMS for Member States



Announcement in ORPNET

IAEA Releases a New Dose Management System (DMS)



The Dose Management System (DMS) for African Member States has been released by the International Atomic Energy Agency (IAEA). The DMS is a software developed under the IAEA Technical Cooperation Project RAF9057: "Strengthening National Capabilities on Occupational Radiation Protection in compliance with Requirements of the New International Basic Safety Standards" with the aim to assist Member States in enhancing the monitoring capability of occupationally exposed workers.

Assessment and recording of the occupational exposure of workers is a key requirement in the IAEA Safety Standards GSR Part 3. In the recent years, with the support of the IAEA, the infrastructure for occupational radiation protection in the IAEA Member States has been strengthened and many Member States have established their dosimetry service laboratories for the monitoring of occupational exposure.

There is a strong demand from Member States to introduce a DMS to effectively manage the monitoring results in the dosimetry service laboratories and to use the data for radiation protection purposes, such as dose tracking and radiation protection optimization assessment.

The purpose of development of the DMS is to provide Member States with a functioning software to manage information required by a dosimetry service, including the collection, storage, evaluation and reporting of data and furthermore to assist Member States with the implementation of the IAEA Safety Standards. DMS has been developed based on the web-based Dose Management System which is being operated by the Individual Monitoring Service Laboratory of the IAEA, taking into consideration the requirements of IAEA Member States in Africa.

The DMS will provide the dosimetry service laboratories with a tool for the management of dose information on both, external and internal exposure of occupationally exposed workers. The DMS has its functions of:

- entering and updating employment data;
- registering occupationally exposed workers;
- maintaining and analyzing doses resulting from internal and/or external exposure; and,
- producing reports and correlating results.

In order to use the IAEA Dose Management System (DMS), the respective organizations in Member States that host a dosimetry service laboratory have to accept the DMS Terms and Conditions and submit the acceptance form to the IAEA through an official channel.

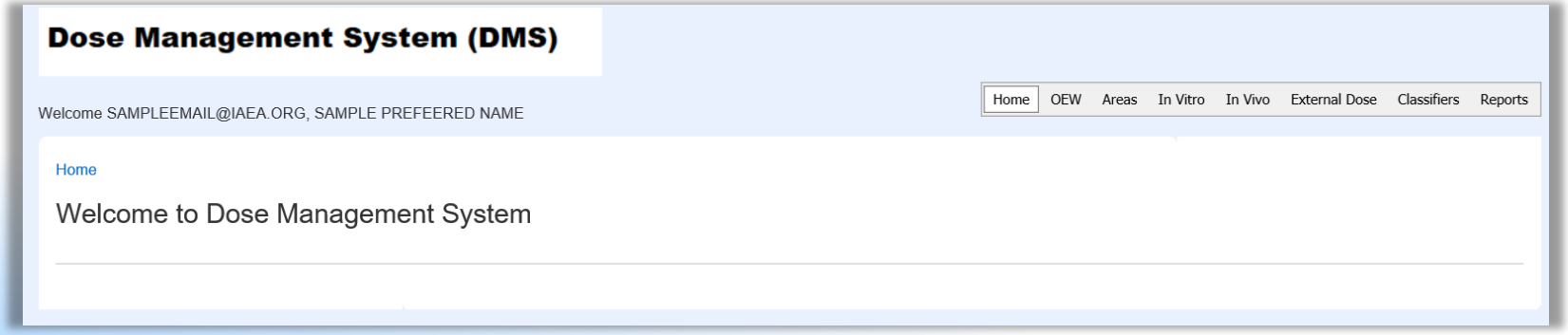
Special thanks go to the Member States in the African region who supported the testing of the software during its development stage.

https://nucleus.iaea.org/sites/orpnet/resources/SitePages/DMS.aspx

DMS for Member States

Main menu:

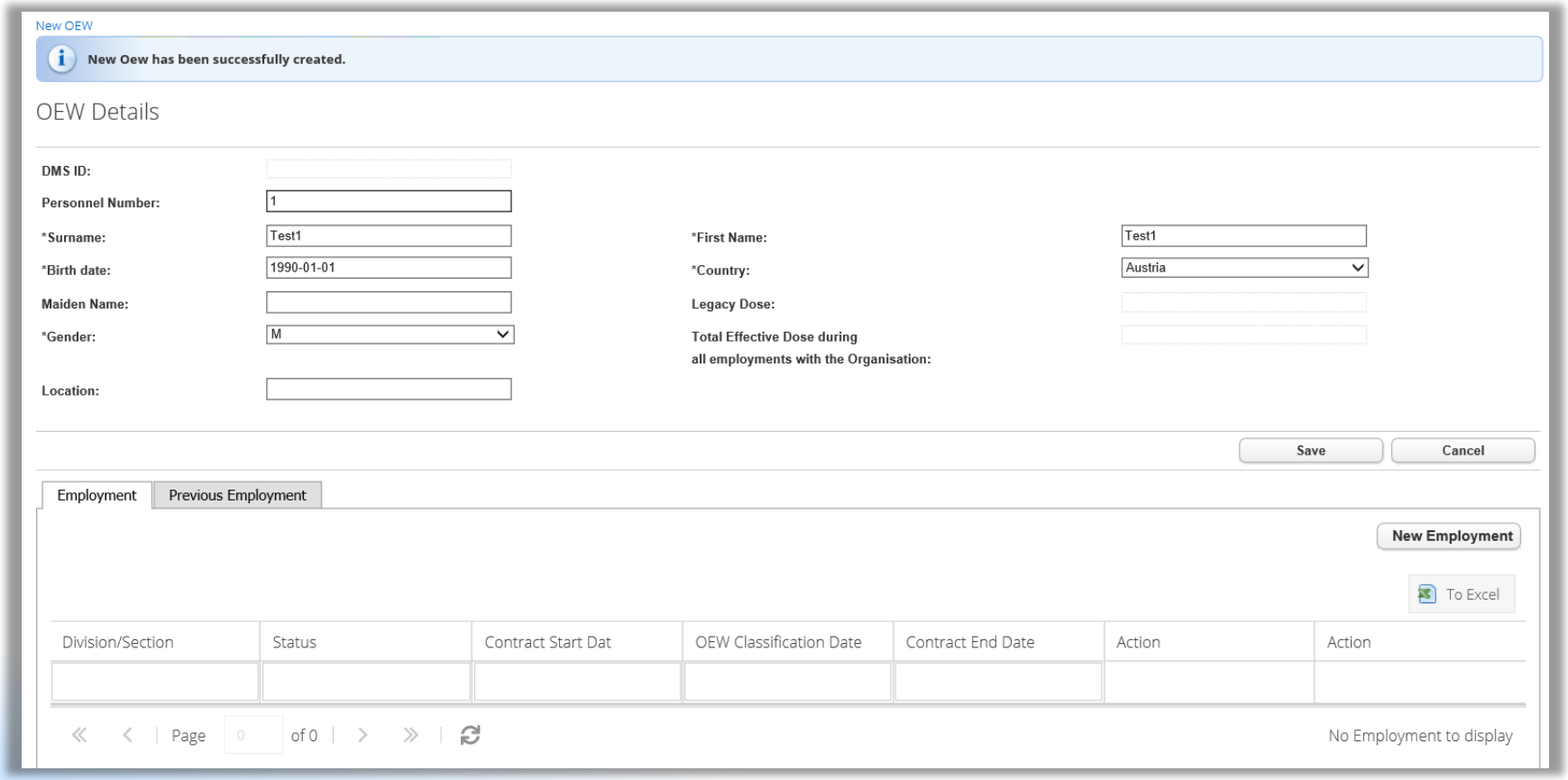
- OEW — Occupationally Exposed Workers
- Areas — Survey of Controlled/Supervised Areas
- In Vitro — Internal Exposure Monitoring (indirect monitoring) – analysis of urine, faeces, saliva samples
- In Vivo — Internal Exposure Monitoring (direct monitoring) – Whole body counting for low and high energy photons
- External dose — External monitoring of whole body and extremities
- Classifiers — Setting options for of monitoring techniques, radionuclides, monitoring frequency, etc
- Reports — Summary information on data, e.g. results of internal and external monitoring



DMS for Member States

Main menu:

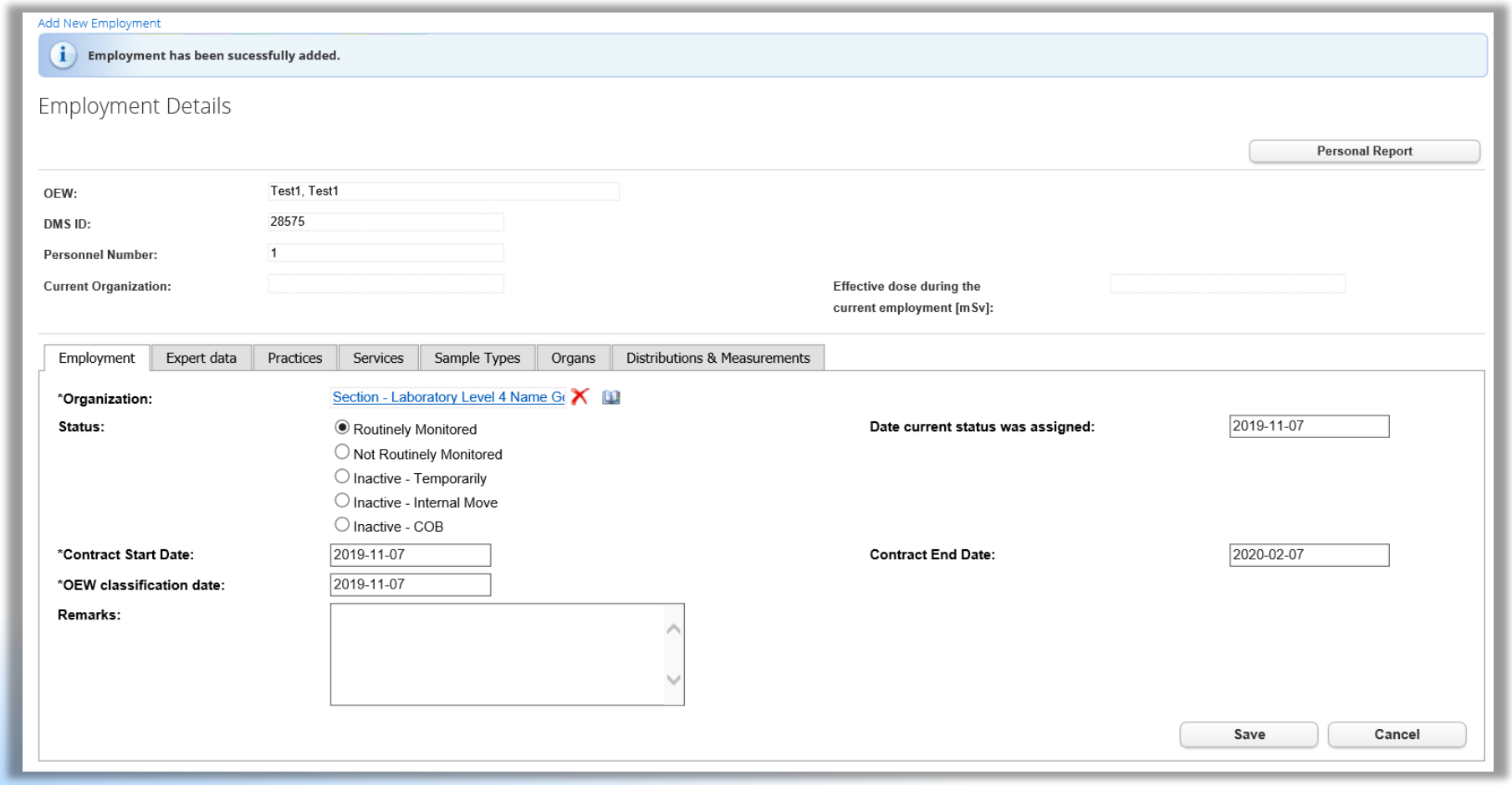
- OEW Occupationally Exposed Workers:
  - Personal data of a worker



DMS for Member States

Main menu:

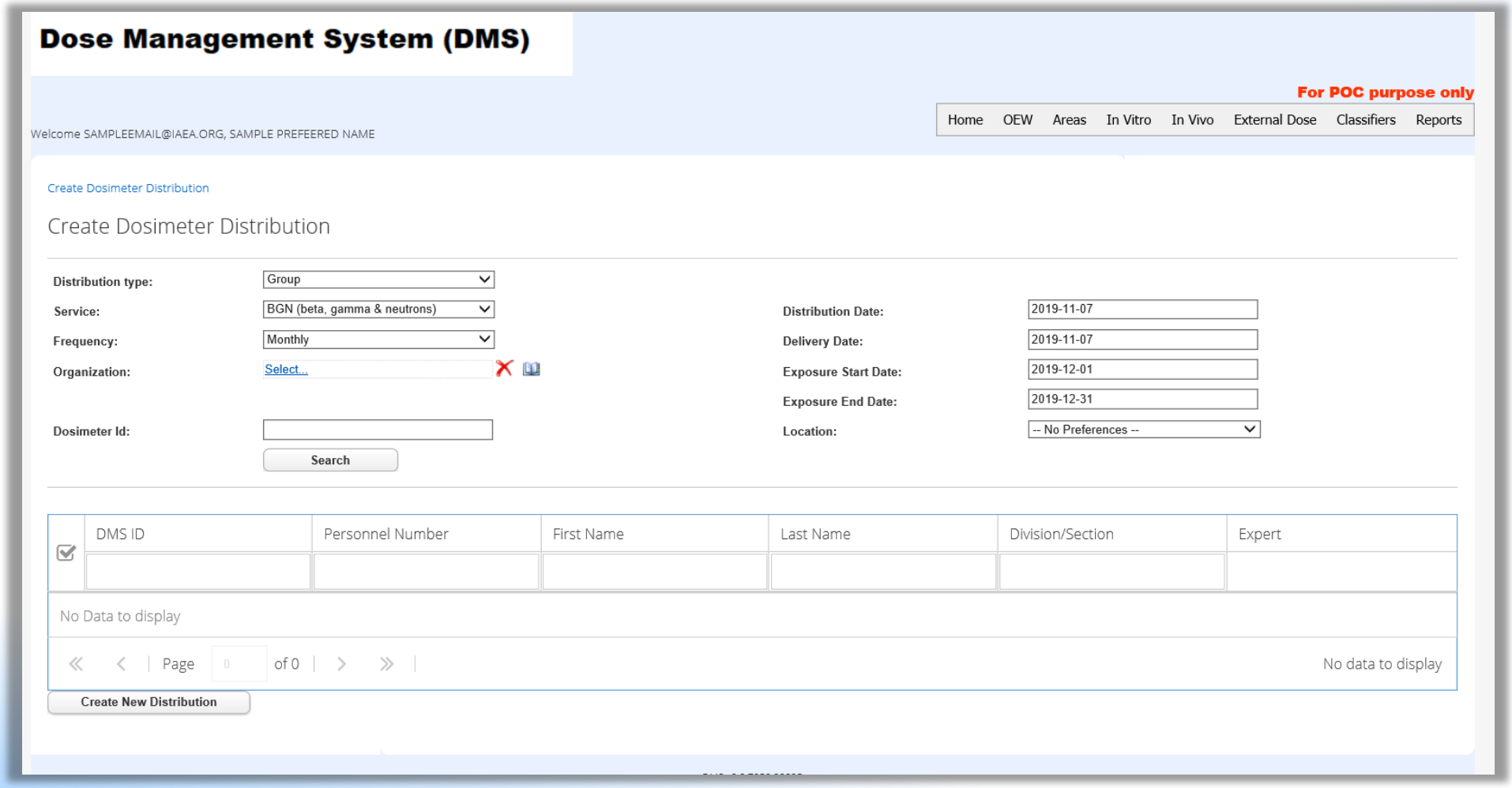
- OEW Occupationally Exposed Workers:
  - Previous and current employments



DMS for Member States

Main menu:

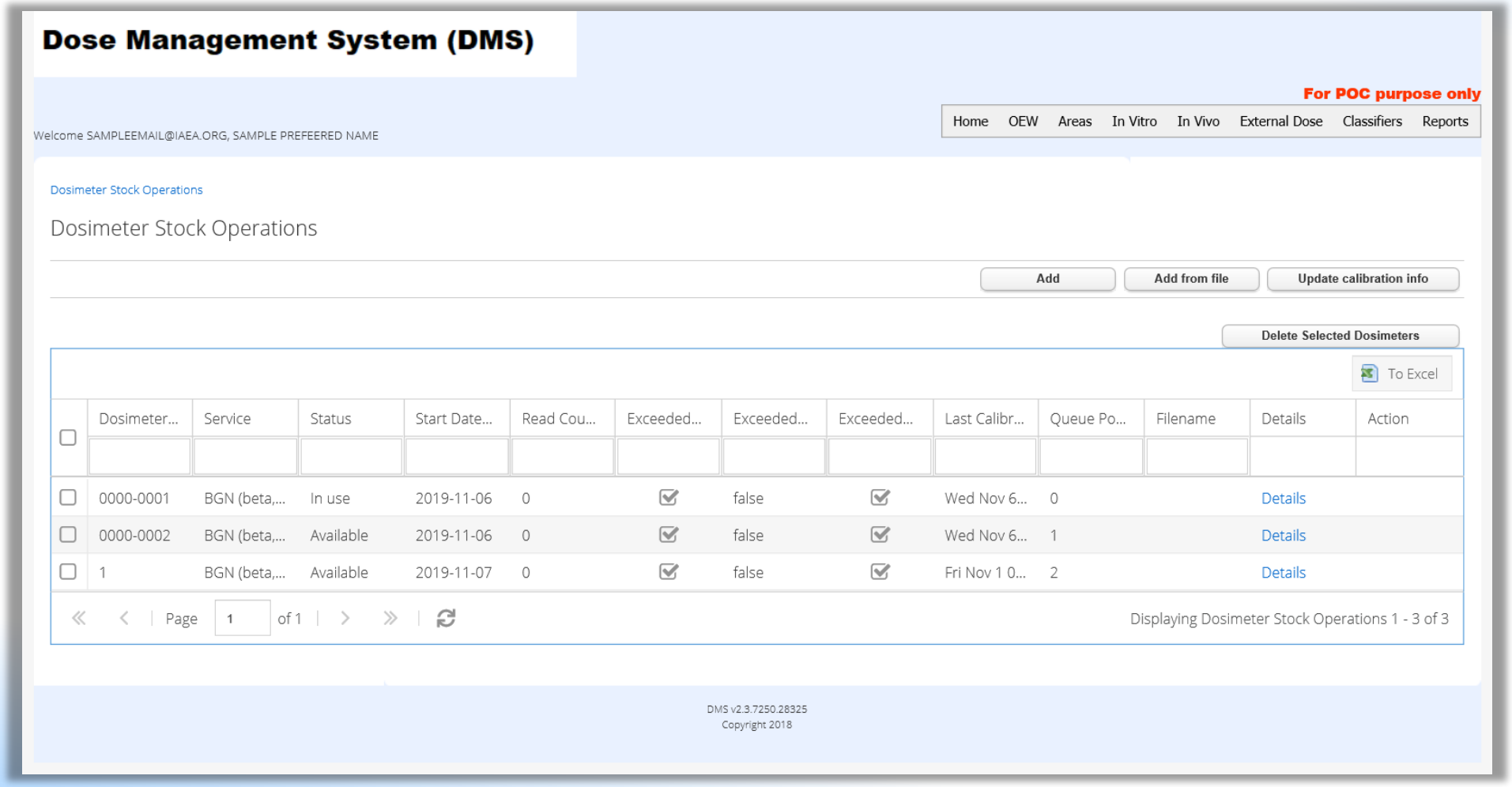
- External dose External monitoring of whole body and extremities
  - Creating distributions based on the system data



DMS for Member States

Main menu:

- External dose External monitoring of whole body and extremities
  - Adding dosimeter stock operations (manually/form file/connecting existing laboratory equipment)

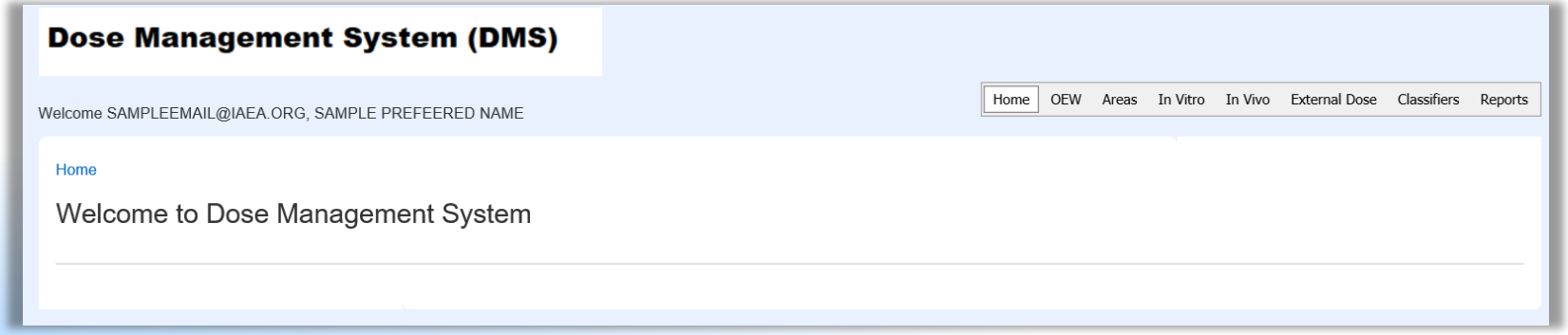


DMS for Member States

Main menu:

- In Vitro Internal Exposure Monitoring (indirect monitoring) – analysis of urine, faeces, saliva samples
- In Vivo Internal Exposure Monitoring (direct monitoring) – Whole body counting for low and high energy photons

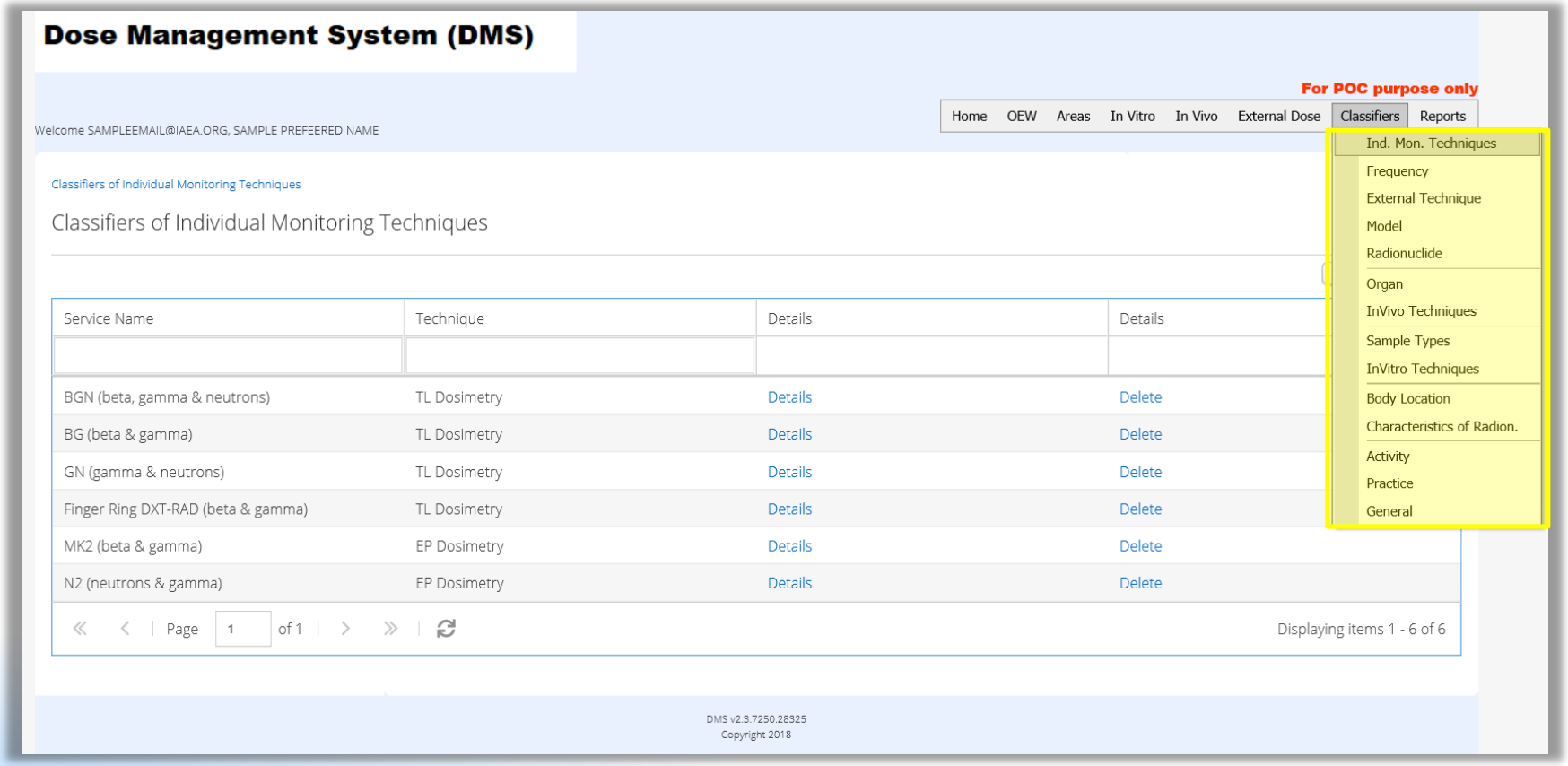
Both areas will work on the same principle as External dose distributions (in terms of software functionalities)



DMS for Member States

Main menu:

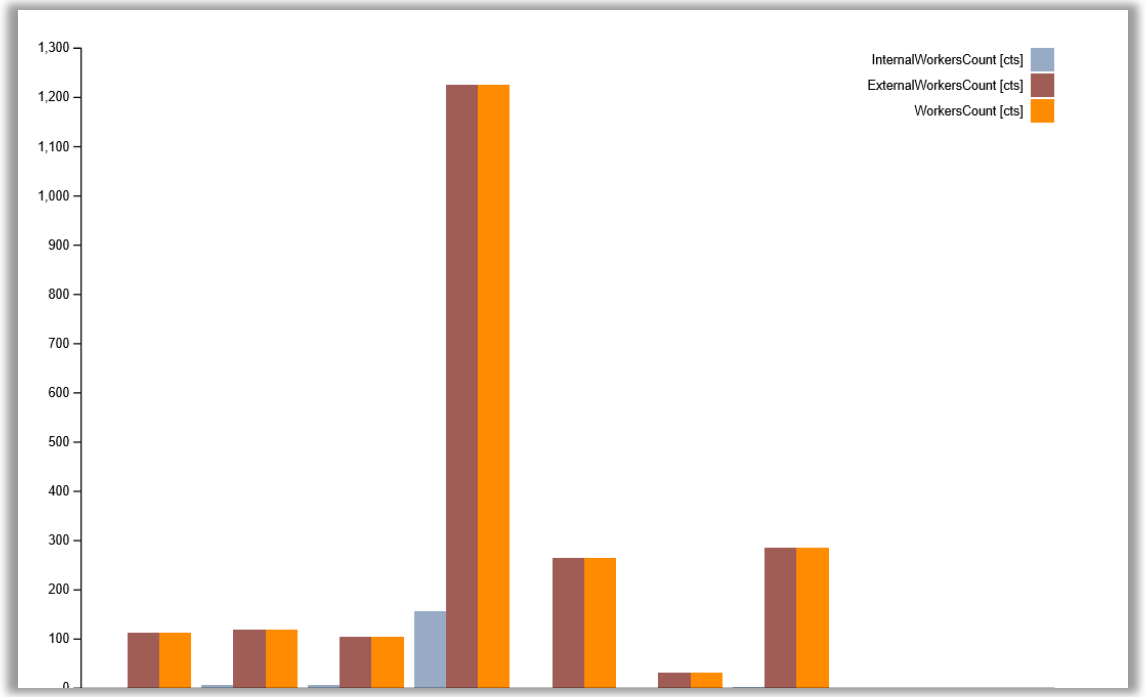
- Classifiers — Setting options for of monitoring techniques, radionuclides, monitoring frequency, etc
  - All classifiers as highlighted below will be able to be adjusted based on the country needs



DMS for Member States

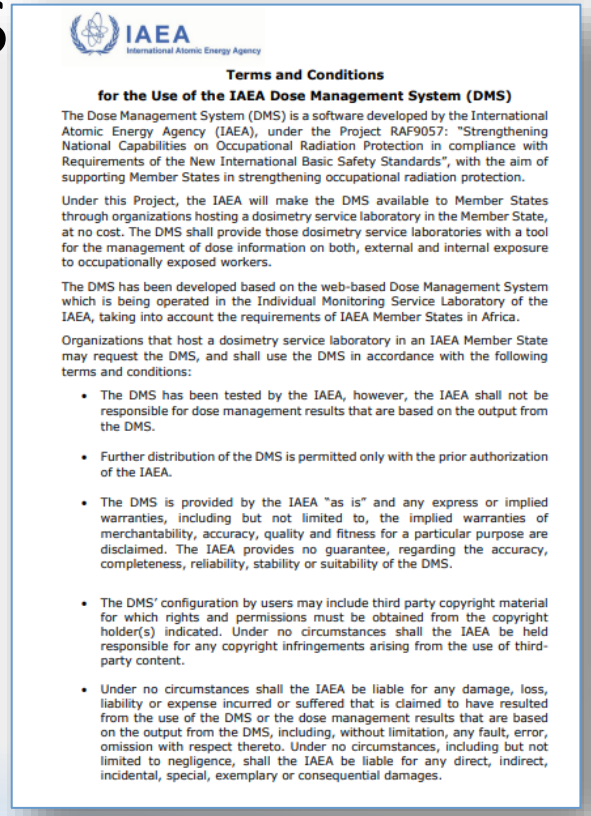
Main menu:

- Reports — Summary information on data, e.g. results of internal and external monitoring



Requests from the Member States

- Official requests form Member States through NLO
- Agreement with the Terms and Conditions
- 22 countries use DMS



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Terms and Conditions

for the Use of the IAEA Dose Management System (DMS)

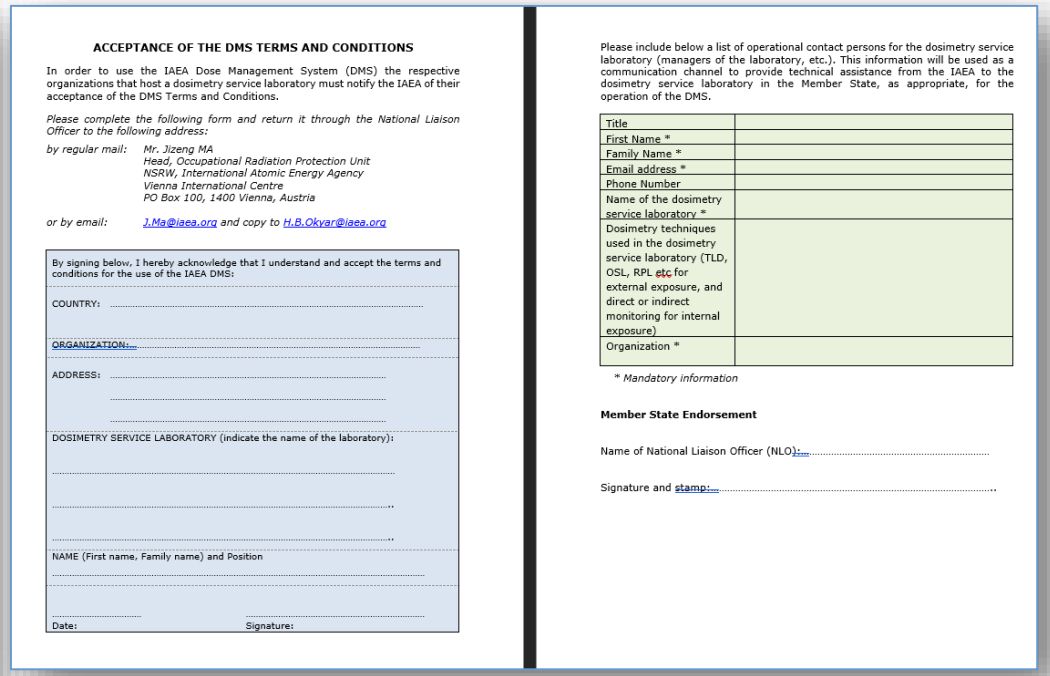
The Dose Management System (DMS) is a software developed by the International Atomic Energy Agency (IAEA), under the Project RAF9057: "Strengthening National Capabilities on Occupational Radiation Protection in compliance with Requirements of the New International Basic Safety Standards", with the aim of supporting Member States in strengthening occupational radiation protection.

Under this Project, the IAEA will make the DMS available to Member States through organizations hosting a dosimetry service laboratory in the Member State, at no cost. The DMS shall provide those dosimetry service laboratories with a tool for the management of dose information on both, external and internal exposure to occupationally exposed workers.

The DMS has been developed based on the web-based Dose Management System which is being operated in the Individual Monitoring Service Laboratory of the IAEA, taking into account the requirements of IAEA Member States in Africa.

Organizations that host a dosimetry service laboratory in an IAEA Member State may request the DMS, and shall use the DMS in accordance with the following terms and conditions:

- The DMS has been tested by the IAEA, however, the IAEA shall not be responsible for dose management results that are based on the output from the DMS.
- Further distribution of the DMS is permitted only with the prior authorization of the IAEA.
- The DMS is provided by the IAEA "as is" and any express or implied warranties, including but not limited to, the implied warranties of merchantability, accuracy, quality and fitness for a particular purpose are disclaimed. The IAEA provides no guarantee, regarding the accuracy, completeness, reliability, stability or suitability of the DMS.
- The DMS' configuration by users may include third party copyright material for which rights and permissions must be obtained from the copyright holder(s) indicated. Under no circumstances shall the IAEA be held responsible for any copyright infringements arising from the use of third-party content.
- Under no circumstances shall the IAEA be liable for any damage, loss, liability or expense incurred or suffered that is claimed to have resulted from the use of the DMS or the dose management results that are based on the output from the DMS, including, without limitation, any fault, error, omission with respect thereto. Under no circumstances, including but not limited to negligence, shall the IAEA be liable for any direct, indirect, incidental, special, exemplary or consequential damages.



ACCEPTANCE OF THE DMS TERMS AND CONDITIONS

In order to use the IAEA Dose Management System (DMS) the respective organizations that host a dosimetry service laboratory must notify the IAEA of their acceptance of the DMS Terms and Conditions.

Please complete the following form and return it through the National Liaison Officer to the following address:

by regular mail: *Mr. Jizeng MA*
Head, Occupational Radiation Protection Unit
NSRW, International Atomic Energy Agency
Vienna International Centre
PO Box 100, 1400 Vienna, Austria

or by email: *J.Ma@iaea.org and copy to H.B.Okyar@iaea.org*

By signing below, I hereby acknowledge that I understand and accept the terms and conditions for the use of the IAEA DMS:

COUNTRY: .....

ORGANIZATION: .....

ADDRESS: .....

DOSIMETRY SERVICE LABORATORY (indicate the name of the laboratory):

NAME (First name, Family name) and Position

Date: Signature:

Please include below a list of operational contact persons for the dosimetry service laboratory (managers of the laboratory, etc.). This information will be used as a communication channel to provide technical assistance from the IAEA to the dosimetry service laboratory in the Member State, as appropriate, for the operation of the DMS.

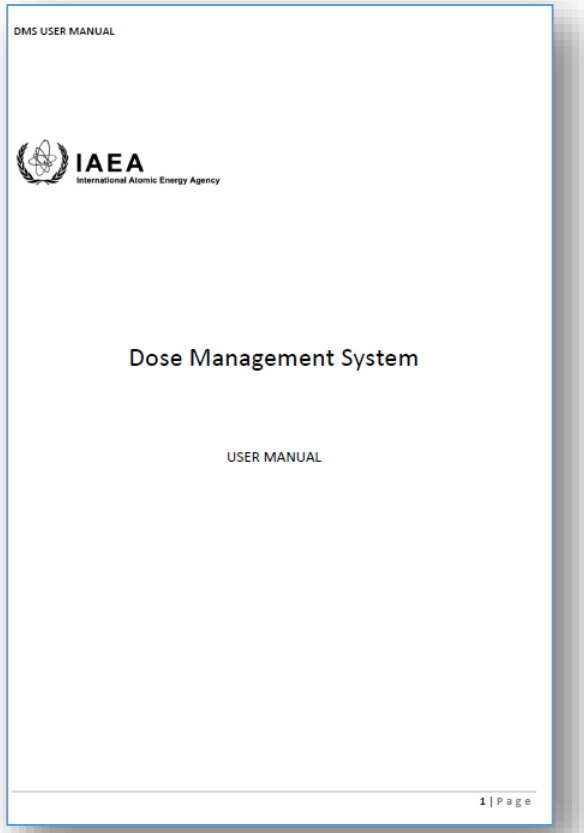
Title	
First Name *	
Family Name *	
Email address *	
Phone Number	
Name of the dosimetry service laboratory *	
Dosimetry techniques used in the dosimetry service laboratory (TLD, OSL, RPL etc for external exposure, and direct or indirect monitoring for internal exposure)	
Organization *	

** Mandatory information*

Member State Endorsement

Name of National Liaison Officer (NLO): .....

Signature and stamp: .....



Name	Type
aspnet_client	File folder
DMS	File folder
iisstart.htm	Microsoft Edge HTML Do...
iisstart.png	IrfanView PNG File

Challenges

- IT infrastructure might be a challenge – Member State will need a server and an installation software – cooperation with local IT departments
- For security reasons, the DMS is a single-user system - all information needs to be entered by the same person regardless of the role i.e., administrator, external dosimetrist, internal dosimetrist on a local PC
- Data upload from the monitoring results

IAEA
International Atomic Energy Agency

Thank you

H. Burçin Okyar
Occupational Radiation Protection Unit
Radiation Safety & Monitoring Section, NSRW
h.b.okyar@iaea.org

IAEA ORPNET: Occupational Radiation Protection Networks (ORPNET) | IAEA