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## The SISERI system : an information system for occupational dosimetry registration

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### Abstract:

The SISERI information system was developed and brought into use in order to meet a workplace health objective aimed at reducing and controlling exposure of workers to ionising radiation in France. This system centralises, verifies and preserves all dosimetric data relating to each worker in accordance with the confidentiality required by the personal nature of this information. The SISERI data are made available to occupational doctors and experts in radiation protection to assist them in monitoring exposure of workers. The data are also intended for statistical processing with the aim of optimising radioprotection for workers. They may also be used for epidemiological studies. The system has been gradually developed since it came into service in February 2005 and is now operating normally so that it is possible to guarantee that all doses received by each worker, anywhere on French territory, are recorded. If this system can be extended outside French borders it will be easier to monitor workers who have to travel to different European countries

### 1 PRINCIPLE OF THE SISERI SYSTEM

The SISERI information system was developed at the request of the Ministry of Labour in order to centralise, verify and preserve all dosimetric data relating to each worker exposed to ionising radiation in France. The dosimetric data collected in the SISERI system constitute a national register of exposure of individual workers. This system is intended for operational users such as occupational doctors and experts in radiation protection. Dosimetric data on individuals are made available to these people via the internet, within the limits set by the regulations, with strict access rules so that confidentiality is preserved. This enables them to monitor exposure, to manage exposure of persons in the best way possible and to check that statutory dose limits are being observed. The monitoring data recorded in SISERI can also be sent to functional users such as labour inspectors and radioprotection inspectors. Finally, these data may be processed for survey purposes with the aim of optimising radioprotection of workers. They may also be used by researchers for epidemiological studies.

Dosimetric monitoring of workers in France annually concerns 280,000 people who are exposed to ionising radiation as part of their work. Each of these workers is monitored by external passive dosimetry with one or more dosimeters suitable for the various types of radiation to which they are exposed. This monitoring is quarterly or monthly. In addition, if there is a risk of exposure of the extremities (hand, wrist etc.), extremity dosimetry is added to this passive whole-body dosimetry. In situations where the person is working in a controlled zone (average hourly dose rate > 7.5  $\mu$ Sv), he or she also carries an active or operational dosimetry system which provides information about his or her exposure in real time. Finally, if there is a risk of internal contamination, the worker is monitored by *in vitro* toxicological measurements or *in vivo* anthroporadiometric measurements. When there is evidence of internal contamination, the occupational doctor calculates the internal dose.

External passive dosimetry measurements are carried out by accredited laboratories approved by the Nuclear Safety Authority. There are eight organisations which currently provide dosimetric monitoring of workers and send the results of the external passive dosimetry to SISERI at regular intervals, at least once a month.

Operational dosimetry is the responsibility of works managers, assisted by experts in radiation protection. Establishments which use operational dosimetry to monitor their own employees or external workers employed on their site send the operational dosimetry results directly to the SISERI system on a weekly basis.

Internal contamination of workers is monitored at the initiative of the occupational doctor and is carried out by accredited biomedical analysis laboratories approved by the Nuclear Safety Authority. The results of anthroporadiometric tests and/or radiotoxicological analyses must be sent to SISERI. When contamination is found, the internal dose must be calculated by the occupational doctor and this value is recorded in SISERI to provide a cumulative measurement of the worker's effective dose.

The SISERI system can also manage dosimetry of flight personnel. This dosimetry is calculated by the airlines using SIEVERT software developed by the IRSN and results are sent by the airlines to the SISERI system.

Dosimetric information or exposure measurements are sent by the various data suppliers to the SISERI system via a secure internet access, using a strictly-defined protocol and transmission formats.

Each item of information sent to the SISERI system is linked to a worker by a unique identifier: his or her registration number on the national population register. Each item of dosimetric information includes, in addition to the dose values, the worker's identifier, information relating to his or her work (employer, status etc.) and information relating to the occupational doctor and expert in radiation protection responsible for this worker. Dosimetric data and their sources are kept for every worker registered in the SISERI system, together with their case history. The data may be accumulated to reconstruct the cumulative effective dose over several years or even over the worker's whole life.

In addition to its capability to centralise data on individual monitoring of workers exposed to ionising radiation, the SISERI information system provides occupational doctors and experts in radiation protection with dosimetric information or measurements of exposure of workers via a secure internet access. Access is subject to authorisation and is restricted to the workers for whom the doctors and experts are responsible (figure1).

## **2 DATA ABOUT THE SISERI SYSTEM**

The SISERI system was brought into service in February 2005 and has been developed gradually since that date. Three years on, the system receives data on external passive and operational dosimetric monitoring regularly and in accordance with the regulations. Internal monitoring data and dosimetric data for flight personnel are not yet sent on a regular basis but this should be possible by the end of 2008 thanks to the current work on the practicalities of transmitting them..

Approved dosimetry laboratories send around 2.3 million items of passive dosimetry data annually. These data are in a pre-defined format so they can be rapidly integrated into the database.

Since the SISERI system came into service, operational dosimetry data transmission has continuously increased: whereas, in 2005, 170 companies had sent at least one item of

operational dosimetry data, this figure increased to 350 in 2006 and to 475 in 2007. Currently the average flow of files received is more than 1400 per month. In total, the number of operational doses sent was 5.5 million in 2006 and 6 million in 2007.

With regard to data retrieval, the number of people who have applied for authorisation to consult individual dosimetric information to which they have the right has steadily increased since SISERI came into service. After one year, 958 experts in radiation protection and 522 occupational doctors had obtained a digital certificate giving them secure access to the database. These figures are now respectively 2000 and 1100. During 2006 and 2007, the increase concerned mainly the number of experts in radiation protection from the medical and veterinary sectors and the areas of defence and research. Feedback shows that experts in radiation protection and occupational doctors from companies which are sub-contractors of major operators and from temporary employment agencies rely on SISERI to monitor the exposure of their workers.

### **3 FUTURE PROSPECTS**

The SISERI information system is able to quickly provide experts in radiation protection and occupational doctors with monitoring data for workers. Operational dosimetry data can be viewed within 24 hours following their transmission. Provision of passive dosimetry data in SISERI still suffers delays which are directly attributable to delay by the approved laboratories in sending the data and to the quality of these data. These laboratories need to address this problem.

The SISERI information system has undergone many changes since it came into service in 2005. Most of these changes are transparent for the user and lead to increased performance. Bottlenecks were identified during the years of its development and steps taken to clear them. Optimal functioning of the system requires strict observance of the obligations of each link in the data transmission chain, with SISERI being the last element in this chain: conformity of the information required, compliance with transmission times etc. This is what is needed if centralisation of dosimetric data, which is the only way to guarantee that all doses received by each worker are actually recorded, is to be fully efficient.

The SISERI information system is a centralisation system, unique in France, relating to monitoring exposure of workers to an occupational risk. In the more specific field of monitoring workers' exposure to ionising radiation, this system of centralisation of data at national level is also totally original and certainly unique in its conception; it makes possible actual monitoring of workers exposed in France, whether these are French workers or foreign workers who come to work in France. The system has been designed so that it will theoretically be possible to widen the scope of data centralisation. It could provide better monitoring of cross-border workers, and possibly European workers. Developments of the SISERI system in this direction could be foreseen in the near future.

Figure 1 : Principle of operation of the SISERI system

