European ALARA Network
http://ean.cepn.asso.fr/
Issue 15 - Octobre 2004

European ALARA Newsletter

Editorial

EURAIDE and SMOPIE: Very positive end-results

EURAIDE and SMOPIE have now reached their endpoints. These two European projects have been set up by the Commission following recommendations from the European ALARA Network workshops (respectively from the 2nd on "Good practices in Radiological Protection in the non Nuclear Industry and Research" at Chilton in the United Kingdom and from the 3rd on "Managing Internal Exposures" at Munich in Germany). This issue of the newsletter gives an opportunity to present their main results. The EURAIDE - EURopean Accident and Incident Data Exchange system - project relied on a survey of all member States, candidate States and associated countries. The main result is that there is a consensus at the European level to have a European-wide data exchange system for incidents and there seemed to be general will to move forward. The proposed objectives are quite similar to those of the national systems, with additional needs in terms of international benchmarking and learning lessons from other countries.

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The SMOPIE (Strategies and Methods for the OPtimisation of Internal Exposure of workers from industrial natural sources) project has generated important information about radiation protection monitoring programs in NORM industries. It provides practical information how to assess the radiological consequences for the workforce in a first screening campaign, and how to get more information when the first screening warrants further research. By this approach, the most efficient use can be made of resources, without spending unnecessary time and money where this is not justified and by advising on the use of the right instrumentation, in a way that produces the quality of results required to implement radiation protection controls. These two projects have been very successful, and the success has its counterpart as will be shown hereafter.

Self-sustainability: A new challenge for the Network

The philosophy of the European Commission, when supporting a new project such as the European ALARA Network is to promote its self-sustainability after a few years, when the project is successful. Therefore, after 8 years of life and very good results (such as those presented here above), it is now our challenge to become totally self sustainable as of the beginning of 2005. To reach that situation a new legal framework will be created and many countries have already confirmed that they will continue supporting the network through different channels (providing in-kind contribution, co-ordination funds, or supporting workshops…).

New projects for the future

In its new form, EAN is hoping to create several new sub-networks particularly in the NORM area, the medical sector, the research on dose and dose rate prediction tools and the management of radiological incidents feedback experience in the non-nuclear field. That situation will also be an opportunity to enlarge the scope of the EAN towards public and patient exposure in normal and accident situations. After the 8th Workshop (September 2004) devoted to "control of occupational exposure through inspection and self assessment" the following 9th workshop will deal with "natural occupational exposures" during the last trimester of 2005.

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Coordinated by CEPN, on behalf of the EC DG-RESEARCH
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European ALARA Newsletter ISSN 1270-9441
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Pilot Study for the Creation of a European Union Radiation Accident and Incident Data Exchange (EURAIDE)

*C. Lefaure * , J. Stewart**, R. Czarwinski****

This study has been funded by the European Commission and has been a collaborative project involving NRPB** (UK), CEPN* (France) and BfS*** (Germany), following a recommendation from the 2nd EAN Workshop.

The objectives of the study were to review the current status of existing (or proposed) radiation incident data systems and to consider, on the basis of information obtained, how a harmonised European-wide data exchange system might be progressed. A detailed questionnaire was sent to a total of 31 countries, being existing European Member States, applicant or associated countries. In summary, 25 countries responded (an 80% response rate). Analyses of the data provided has allowed the following broad conclusions to be drawn:

i) Two thirds of countries have, or make use of, an incident data system in some form. However, there is almost no consistency in approach and just over half of the countries involved in the survey have their own established national system. As for the countries that did not respond (Bulgaria, Denmark, Estonia, Hungary, Latvia and Malta), personal contacts suggest that, in general, they do not have formal incident data systems.

ii) The existing systems either:
- deal with the management of violations in terms of dose limits or investigation levels and are then a tool for further actions; or
- are focussed on the effects of the event and then provide lessons to be learnt to avoid re-occurrence of that event.

The survey indicated that there is no universal definition of what constitutes a radiological "incident". Each country has provided its own definition and it is not surprising that there is no homogeneity in the way incidents are currently reported, submitted or selected. Therefore a need for a common definition in order to set up a system of exchange is obvious.

In summary, in 15 countries having their own system the primary objective is formal mandatory declaration of incidents. Only the Netherlands and Switzerland did not state this to be a key objective.

Statistics are produced from within 12 systems. For four of these, the statistics are for use by regulators only. Statistics are not routinely produced from six of the systems but one (Iceland) is developing a means of producing statistics.

15 systems are used to learn lessons and 13 to facilitate feedback. Five use case studies and lessons only for regulators, eight publish selected examples, and five publish all reported incidents, generally through public annual reports. One has produced a CD rom (French IRSN system), four have put case studies on their website (all incidents for IRID (UK) and RELIR (France), which are the only two systems totally devoted to feedback and training).

All respondents see a positive advantage in having a European-wide data exchange system for incidents and there seemed to be general will to move forward. The proposed objectives are quite similar to those of the national systems, with additional requirements in respect of an international benchmarking and the learning of lessons learned from incidents in other countries.

As well the European Directive on sealed sources states clearly in its article 11 how important it is to inform all countries about events especially in the case where sealed sources are involved.

For these reasons, the next step is now a workshop that will be organised at the European level by the Commission to elaborate precise recommendations on the future European system EURAIDE.

Initiation of the European Platform on Training and Education in Radiation Protection (EUTERP Platform)

J. van der Steen

NRG, the Netherlands

This paper describes the results of a feasibility study to establish a European Platform on Training and Education in Radiation Protection (EUTERP Platform). The study made recommendations, based on the summary and conclusions of a workshop attended by almost all Member and Applicant States of the European Union. The workshop was held at CIEMAT, Madrid, Spain, on 20-21 May 2004. The study identified how the future Platform could be initiated and developed in order to achieve the expected results.

The objectives of the Platform can be summarised as:

- to better integrate education and training into occupational radiation protection infrastructures in the Member and Applicant States of the European Union;
- to facilitate the transnational access to vocational education and training infrastructures;
- to harmonise the criteria and qualifications for and mutual recognition of Radiation Protection Experts;
- to remove obstacles for the mobility of these experts within the European Union.

The study concluded that a pragmatic and stepwise approach was necessary for a harmonised and

internationally agreed system of recognition of radiation protection experts. It was recognised that all countries have their own education system and it would be impossible to strive for uniformity in the educational approach. Instead of that, harmonisation should be reached through diversity of education and training systems and by evolution of internationally agreed criteria for the qualifications of the radiation protection expert. Recognition should not only be based on the initial education and training, but also on competence.

The workshop concentrated on the programmatic issues that should be taken up in the work plan of the Platform, as well as on structural issues, to ensure an effective and efficient conduct of the work. 19 recommendations have been identified dealing with the work programme of the Platform. These were divided in 6 different areas, namely:

- Education and training requirements for Radiation Protection Experts
- Mutual recognition
- Education and training infrastructure
- Training needs
- Training courses
- Effectiveness, efficiency and quality management of the Platform.

The recommendations dealing with the requirements for radiation protection experts were considered to be key elements, which should be addressed with the highest priority by the Platform.

The workshop also discussed possible options to structure the Platform. Given the large number of potential participants (2 per country and representatives of international organisations and associations), the structure of the Platform should ensure an efficient and effective management. The national participants of the Platform should cover the following categories:

- National competent radiation protection authorities
- National bodies responsible for professional education and vocational training
- Providers of training and education in the radiation protection area
- Professional organisations representing the receivers of training and education

The structure of the Platform should make it possible to co-operate with other projects and networks and it should be self-sustainable after an initial period of time.

Given the number of participants and the number of issues to be addressed by the Platform, there was consensus about a general framework of the Platform. It was recommended that it should be run by a co-ordinator, with the help of a Co-ordination Committee. Where necessary Working Groups could be installed, consisting of Platform participants and other invited experts, to carry out specific tasks. Given the fact that the participation per country should be restricted to a maximum of two, it would be preferable to stimulate the formation of national "outposts" of the Platform, consisting of the above-mentioned categories of stakeholders. Such outposts are considered to be essential elements for involving all customers of the products of the Platform, which could considerably contribute to the sustainability of the Platform at a later stage.

Three options for a structure have been identified, which take into account the above-mentioned general considerations. In the preferred option, the Platform should be established by the Commission in a phased approach, to avoid the disadvantages of embarking on a full workload without any experience. To this end, it was recommended that the Commission should appoint a co-ordinator and establish a Co-ordination Committee to elaborate the key elements of the recommendations. These were considered to be essential in the process of achieving harmonisation in the E&T requirements for RPEs in the Member and Applicant States of the European Union. The co-ordinator, together with the Co-ordination Committee should then prepare another workshop to discuss the results of the work carried out so far and to identify a follow-up work programme.

The restricted number of persons involved in this initial phase has the advantage of being easier to manage, in order to reach the goals. It would also allow some more time in the establishment of the national outposts to the Platform, by convincing stakeholders of the benefits of the Platform on the basis of successful results in the first phase. At the time of the new workshop, and taking into account the results of the first phase, the Commission could decide on a further expansion of the Platform, as discussed above in the first option.

The participation in the workshop of almost all Member and Applicant States reflect the great importance that is attached by them to the subject. It showed the willingness to participate, also in the future when the Platform has been established and is operational. This is a prerequisite for success in order to keep the momentum, the Commission has already stated its intention to take the next step in the initiation of the Platform in the second half of 2004.

ALARA TRAINING

A new ALARA course for occupational exposure, in french, is organised by CEPN at INSTN (Saclay) on 8-10 March 2005.

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Strategies and Methods for Optimisation of Internal Exposures of Workers from Industrial Natural Sources (SMOPIE)

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❑ Introduction

Work activities with materials containing natural radionuclides (NORM) can involve significant exposure of workers, due to internal contamination by inhalation. However, there can be considerable differences in work place conditions, radionuclides involved and the physical and chemical matrices in which the radionuclides are incorporated. The project covered occupational internal exposures in various NORM industries. The study, carried out for the European Commission in the 5th Framework Programme under contract N° FIGM-CT2001-00176, aimed to recommend monitoring strategies and methods to optimise radiation protection.

❑ Objective

The objective of the study was to recommend monitoring strategies and methods for optimising internal exposure in a range of exposure situations. This was achieved by the following steps:

- to prepare a summary of number of workers in the EU that may be exposed to NORM;
- to study cases of real internal exposure situations, in co-operation with industry;
- to evaluate monitoring strategies and methods for optimisation of internal exposure situations;
- to recommend monitoring strategies and methods in the main exposure situations.

A detailed assessment of exposure conditions in industrial workplace conditions (case studies) has been made, in close co-operation between the contractors and their industrial partners. This provided the basis for recommending monitoring strategies and methods for optimising internal exposure in a range of exposure situations. The industrial processes and the natural radionuclides of concern are given in table 1.

Table 1. Industrial partners in SMOPIE

Industry	Process	Main natural radionuclides
Thermphos International B.V. The Netherlands	Elementary phosphorus production from phosphate ore	^{210}Po, ^{210}Pb
Kerr-McGee The Netherlands	TiO_2 production from rutile	^{238}U, ^{232}Th
COMURHEX France	UF_6 production from uranium ore concentrates	^{238}U
UK Heavy Mineral Sands Association, United Kingdom	Zircon sands processing	^{238}U, ^{232}Th
UK Heavy Mineral Sands Association United Kingdom	TiO_2 production from rutile and beneficiate	^{238}U, ^{232}Th, ^{226}Ra, ^{228}Ra

❑ Number of workers and associated dose levels

The study summarized the available information in Europe on the number of workers exposed to internal contamination and the dose levels involved. The results show that there is a severe lack of data. Several studies have been reviewed, but they do not provide the information for a scientifically sound evaluation of the problem. The scarce information indicates that there may be about 85,000 exposed workers (see table 2). This number certainly warrants more research in this area.

Table 2. Estimates of the number of potentially exposed workers in EU NORM industries

NORM industry and work activity	Number of exposed workers (rounded)	Basis for estimate
Thoriated electrodes, production, grinding and use	70 000	Extrapolation of Dutch and German data
Phosphate fertiliser trade and use	10 000	German data multiplied by 4
Oil and gas production, exposure to scale dust at maintenance	2 000	Based on 1000 production installations and two workers potentially exposed annually per installation
Other industries	~ 3 000	
Total (rounded)	**85 000**	

❑ Monitoring strategies and methods

General considerations for dose assessments

In many studies occupational doses from exposure to NORM have been calculated by making use of exposure scenarios and (conservative) parameter values. For accurate dose assessments, it is necessary to set up monitoring programs. Important issues are the spatial variation of airborne dust, time variation of the exposure, mobility of workers, multiple dust sources of exposure and non-uniformity of the dust composition. Personal air sampling should be preferred above static air sampling. The SMOPIE results provide a scientific and practical basis for monitoring programs, both for individual workers and for the workplace.

Aerosol characteristics, lung clearance classes and dose coefficients

For an accurate dose assessment it is necessary to have information about the characteristics of the aerosols, in terms of AMAD and Geometric Standard Deviation (GSD), the lung clearance class of the radioactive compounds in the aerosol (F, M and S), and the dose coefficients for these compounds.

Dose coefficients for other lung clearance classes and particle sizes have been calculated for the main radionuclides belonging to the ^{238}U and ^{232}Th natural

chains for a wider range of particle sizes than available from ICRP. An example is provided in table 3 for inhalation of particles with AMAD 5 μm and GSD 2.5. From this table several important observations follow with respect to the ratios between the dose coefficients for particles with lung solubility class S and F respectively:

- The S/F ratio is high for ^{226}Ra (16) and even higher (87) for ^{226}Ra with low Rn emanation rate;
- The S/F ratio is about 10 for ^{238}U, ^{234}U and ^{228}Ra and about 4 for ^{210}Pb and ^{210}Po;
- The S/F ratio is very low for ^{232}Th and ^{230}Th;
- Dose coefficients for class S and M natural radionuclides are rather strongly AMAD dependent; those for class F are only slightly dependent on AMAD.

Table 3. Workers dose inhalation coefficients (Sv/Bq) and their ratios for individual radionuclides and chain segments. AMAD 5 μm, GSD 2.5

Nuclide, chain or chain segment	Fast	Moderate	Slow	Ratio S/F	Ratio S/M
^{238}U	5.9E-07	1.7E-06	5.7E-06	**9.8**	3.5
^{234}U	6.5E-07	2.1E-06	6.8E-06	**10**	3.2
^{230}Th	1.2E-04	2.8E-05	7.2E-06	**0.06**	0.26
^{226}Ra	4.4E-07	2.2E-06	6.9E-06	**16**	3.2
^{226}Ra *)	4.4E-07	1.4E-05	3.8E-05	**87**	2.8
^{210}Pb	1.1E-06	7.4E-07	4.3E-06	**3.8**	5.7
^{210}Po	7.3E-07	2.2E-06	2.7E-06	**3.7**	1.25
^{238}Usec	1.2E-04	3.7E-05	3.4E-05	**0.28**	0.92
^{238}Usec *)	1.2E-04	4.8E-05	6.5E-05	**0.53**	1.36
^{226}Ra+	2.3E-06	5.1E-06	1.4E-05	**6.1**	2.7
^{226}Ra+ *)	2.3E-06	1.6E-05	4.5E-05	**20**	2.8
*) Low Rn emanation rate					
	Fast	Moderate	Slow	**Ratio S/F**	Ratio S/M
^{232}Th	1.3E-04	2.9E-05	1.2E-05	**0.09**	0.41
^{228}Ra	1.1E-06	1.7E-06	1.1E-05	**10**	6.7
^{228}Th	3.4E-05	2.2E-05	2.5E-05	**0.74**	1.14
^{232}Thsec	1.6E-04	5.3E-05	4.9E-05	**0.30**	0.92

Special attention should be paid to NORM materials with a very low Rn emanation, since these have a much higher dose coefficient than the standard Ra compounds, for which ICRP assumes by default a high Rn emanation rate. The current ICRP biokinetic model for Ra assumes that Rn emanates very efficiently from the inhaled particle, with an escape rate of 100 d^{-1} from the respiratory tract. This means that Rn and its short-lived daughters do not contribute to the dose to the lungs, even when the particle is poorly soluble. Many NORM materials, however, show a very low Rn emanation of only a few percent. When such a particle is inhaled the emanation will not change significantly. Since a large part of the potential alpha energy of Rn and its daughters is not taken into account, the dose to the lungs is underestimated by a factor of 5 to 6.

Requirements for monitoring techniques

The technical capabilities and general suitability of monitoring techniques have been considered. The monitoring strategies currently applied have been described and the technical capabilities and limitations of different forms of monitoring have been reviewed. The aim of the review was to determine which types of monitoring are the most effective to the optimise protection against internal exposures.

❑ Conclusions

Review of the number of exposed workers and magnitude of internal doses in EU NORM industries

The results have revealed that there still is a severe lack of information on the number of exposed workers in NORM industries and the associated occupational doses. The studies carried out so far, on a national level in response of the implementation of Title VII of the European BSS or ordered by the European Commission, do not provide the information for a scientifically sound evaluation of the problem. The number of 85,000 exposed workers, as derived in this study, warrants more research in this area.

There are some observations to be made with respect to this assessment.

- The available data were very scarce and originating from only a few of the EU Member States. This necessarily led to a very rough estimation of the total number of exposed workers in the EU.
- The greatest group of exposed workers (70,000) seems to be welders using thoriated welding electrodes. The data that do exist suggest that grinding of welding rods may give rise to doses between 6 and 20 mSv per year. Although there are tens of thousands of such workers in this area, dose assessment data is surprisingly scarce. Furthermore, there is some evidence that alternative (non-radioactive) welding rods are increasingly being used. This means that the number of exposed workers should decrease in the future. Again, however, precise details on this trend were not available
- The second largest group of exposed workers (10,000) are those trading or using phosphate fertilisers. Here also, the data are originating only from one country, i.e. Germany.
- The results indicate that, apart from grinding of thoriated welding rods, zircon milling may also give rise to doses between 6 and 20 mSv per year, in workplaces where protection measures are poor or non-existent. Rare earth processing may even give rise to doses above 20 mSv per year. In both industries, the number of exposed workers is small.
- Most of the industries give rise to doses below 6 mSv per year. With the exception of the industrial areas mentioned above, the number of exposed workers per type of industry is moderate to small. Given the rough and conservative dose assessments

this is on the one hand reassuring. On the other hand, from a radiation protection point of view these dose levels are still significant and justify a closer and more specific evaluation, certainly when one compares this with the attention paid to decrease the collective and individual doses due to exposure to artificial radionuclides.

- The information gathered from the Accessing and Applicant Countries is even less than that from the EU Member States. In fact, the only project where some information may become available from some of those countries is TENORMHARM. It should be noted that some of these countries have important mining industries, several of which have considerable problems with NORM. There is no information included in Work Package 1 about this type of industries.

In most cases, exposure of workers to natural radionuclides can be reduced considerably when operators and authorities are aware of the problems. The findings of this project show that there still is a basic lack of data. The guidance of the European Commission to the EU Member States about the implementation of Title VII of the Euratom BSS has not led to specific information, necessary to accurately assess the magnitude of the problems. It is recommended that the European Commission should promote and direct future research in this area.

Monitoring strategies, methods and tools

The co-operation with the industrial partners has contributed, to a large extent, to the success of the project. The companies were selected on the basis of the work that they have carried out in the past to understand the radiological consequences of the presence of natural radionuclides in the processes, products, residues and wastes. They all belong to the major industries in their sector and, in fact, they were the only sources of information on numbers of exposed workers and doses associated with certain types of jobs. All the companies have a long record of radiation protection research. They provided a wealth of information and data, which has been used in the project in order to formulate practical and useful recommendations for monitoring strategies, both for themselves, for other operators and for authorities.

The results of the project provide a scientific and practical basis for monitoring programs, both for individual workers and for the workplace. The details of the work are presented in a separate accompanying report. The importance for radiation protection is illustrated by the fact that it describes the way to use sampling equipment which has intrinsically be designed for industrial hygiene instead of radiation protection purposes. This is by no means self-evident, since samplers cannot sample the true ambient aerosol required for radiation protection purposes. This has two notable effects, firstly in terms of assessing the activity concentration in air, and therefore the intake in Becquerels, and secondly in terms of assessing the effective dose. The results show that for specific situations a preferred sampling protocol should be used. It also provides correction factors, to be used to minimise the bias in the dose assessment, either because of unknown parameters or because of a non-ideal sampling procedure. Without such correction factors, significant errors can be made in the assessment of internal exposures.

In conclusion, the project has generated important information about practical radiation protection monitoring programs in NORM industries. It provides practical information how to assess the radiological consequences for the workforce in a first screening campaign, and how to get more information when the first screening warrants further research. By this approach, the most efficient use can be made of resources, without spending unnecessary time and money where this is not justified and by advising on the use of the right instrumentation for the job, in a way that produces the quality of results required to implement radiation protection controls.

The scientific basis for monitoring can also be relevant to manufacturers, for further development of sampling equipment, in order to make them more suitable for use in radiation protection in NORM industries.

European Studies on Occupational Radiation Exposure (ESOREX)

Ing. Karla Petrová, State Office for Nuclear Safety Czech Republic

Purpose of ESOREX

The ESOREX project was initiated by the European Commission in 1997. The objectives of this European study is two-fold:

- Firstly, it shall provide the European Commission and the national competent radiation protection authorities with reliable information on how personal radiation **monitoring, reporting and recording** of dosimetric results is structured in European countries.
- Secondly, there is a strong demand for **reliable and directly comparable data** on individual and collective radiation exposure in all occupational sectors where classified workers are employed. Therefore, it is important to receive information about the levels of individual personal radiation doses to workers in the different sectors and the trends and developments of these doses over a period of several years.

ESOREX consists of numerous data surveys on occupational radiation monitoring and exposures in European countries. The surveyed and assembled information shall form an information base for practical steps that should be taken so that European countries can

meet the challenge of **establishing a harmonised radiological protection system in Europe** including future legislative initiatives of the Commission.

At present, all 25 European Union Member States, plus Bulgaria, Iceland, Norway, Romania and Switzerland, participate in the study.

The work is directly linked with the operational implementation of the Council Directive 96/29/Euratom, laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation.

Administrative measures and arrangements are needed for the operational implementation of the radiation protection requirements provided by Titles IV, V, VI and VII of the Basic Safety Standards Directive. The provisions laid down by these Titles require that Member States shall make the necessary arrangements for the establishment of systems for monitoring, reporting and recording of worker doses. Furthermore, the Directive provides for a reduction in the annual dose limits for occupational exposure and exposure of members of the public. The Directive requires also that occupational exposure from activities with of naturally occurring radiation material at specified workplaces shall be monitored, where appropriate.

The implementation requires not only substantial changes in the respective legal framework for radiation protection (i.e. acts, ordinances, guidelines) of each Member State, it may lead also to considerable changes in the national dose monitoring and recording systems, for example :

- The reduction of the annual dose limits for workers leads to a corresponding shift of national recording and reporting levels;
- Due to technical detection limits it is also a new challenge for services monitoring the internal exposure of the workers;
- In the case of the introduction of a 5-year dose limit, the accumulation of individual dose measurements over a longer period is necessary;
- The monitoring of occupational radon exposure in mines, caves or drinking water facilities requires new monitoring facilities and structures;
- The evaluation of doses for air crew is officially required, programmes for the calculation of flight doses have to be approved.

The European Commission has not only the duty to monitor the status of Directives adoption, it also supports this process by issuing action-guiding recommendations. These shall enable the Member and Candidate States to meet these new requirements, by adopting appropriate legal provisions and practical measures. The last Technical recommendations concerning the individual monitoring is EUR 14852 issued in 1994 year, which is now waiting for revision after the new EU BSS adoption. For this purpose, reliable information on the national personal monitoring systems in European countries including the information on the current registration systems used as well as comprehensive overview of data about the radiation exposure of radiation workers, are necessary and valuable.

ESOREX survey concept

The Survey consists of two parts. Part I surveys how radiation protection monitoring, recording and reporting is arranged within each of the 30 European countries. Part II collects doses from occupational exposure of classified workers in the participating countries. For each country, information is provided on the number of workers in defined work categories and how annual individual personal doses are distributed. The summary and the conclusions provide tentative recommendations for necessary modifications of some of the national monitoring, reporting and recording arrangements.

As a result of the ESOREX studies, a beneficial, effective and extensive information base covering about thirty European States has been created. The studies resulted in the final reports describing the legislative, administrative, organisational and technical aspects of the national dose monitoring and recording systems for occupationally radiation exposed workers in a standardised and, as far as possible, internationally comparable structure. The dose distributions of the radiation workers and the annual average and collective doses in the various work sectors and work sub-categories for the years 1995 - 2000 are also described. One major aim in choosing this 10-year time period is to document how occupational radiation exposure in Europe changed after the implementation of the new dose limits by the Council Directive 96/29 EURATOM.

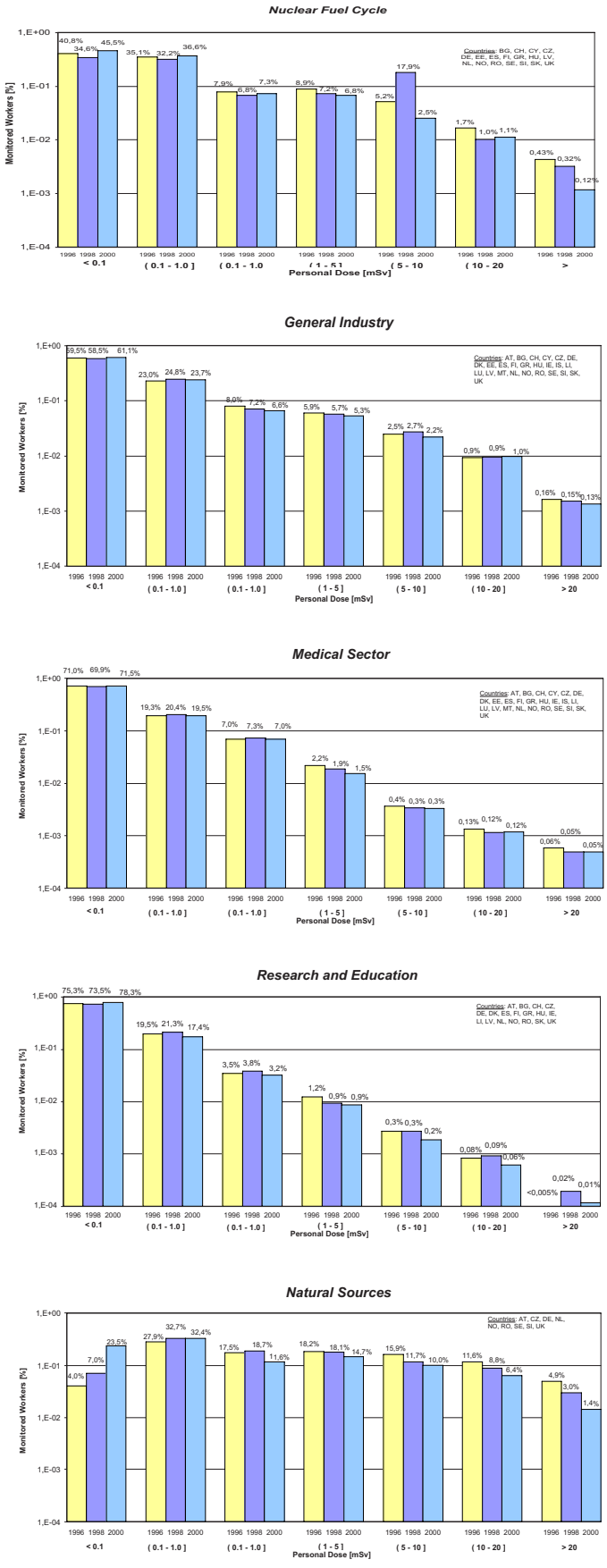
Previous ESOREX studies

Since 1997 the following ESOREX studies have been executed

- ESOREX WEST (Austria, Belgium, Denmark, Germany, Finland, France, Greece, Iceland, Ireland, Italy, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom), part I + part II (1995)
- ESOREX EAST (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia), part I + part II (1997)
- ESOREX 2000, update of part I + part II (>1995-2000)

These studies were executed under the management of the German Bundesamt für Strahlenschutz (BfS) and accompanied by an international steering committee. A first overview of the results from ESOREX 2000 study has been presented on the IRPA 11 conference in Madrid in 2004:

Distribution of Personal Doses from Occupational Radiation Exposure in Europe



ESOREX study 2005

As a result of a call for tender of the European Commission/DG TREN in 2003 the new ESOREX study called "ESOREX 2005" is initiated and will be managed under the responsibility the State Office for Nuclear Safety of the Czech Republic (SUJB). SUJB would like to guarantee the compatibility of this fourth ESOREX study with the previous surveys. Therefore, the study will be performed in close co-operation with the German BfS, which was successfully leading the three previous ESOREX studies.

The ESOREX Steering Committee will continue to accompany the project with the same members: Dr. Klaus Schnuer (EC/DG TREN, EU), Dr. Gerhard Frasch (BfS, Germany), Dr. Phil Gilvin (NRPB, UK), Dr. Janwillem van Dijk (TNO, The Netherlands), Ing. Karla Petrova (SUJB, Czech Republic).

ESOREX 2005 is scheduled for the next three years and the main goals will be:

- to finalise the updating of the country reports by describing the current situation on the field of occupational exposure control, evaluation and registration of personal doses of radiation workers
- as a second part of the study, to collect dosimetric data for the period of the years 2001 - 2005.

ESOREX workshops

Two workshops were already organised in the frame of ESOREX studies with the aim to establish close relationships between involved countries and individuals: in Luxembourg in 1997 during ESOREX WEST and in Prague in 1998 for ESOREX EAST. But so far there was no opportunity for all participating countries to meet together at the same time and for the same reason. Therefore, in the beginning of the ESOREX2005 study we would like to re-establish the relationships established. The success of this international co-operation depends very much on a face-to-face contact, so there is the intention to organise the third ESOREX workshop for all thirty participating countries together.

The meeting shall also lay the ground for a European network that establishes personal contacts and encourages to mutual information exchange.

ESOREX website

A dedicated web site is in preparation and is waiting for approvals for publishing the detailed results. Some general information is already available at www.esorex.cz.

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Analysis of a radiological Incident
Case study (no 15) :
Radiography incident occurred in Spain on April - 2004

L. Urteaga, B. Tamayo

❑ **Description / Radiological Consequences**

On 28 April, the Spanish Regulatory Authority (CSN) was notified of an event resulting in the overexposure of two radiographers because they were working near to radioactive source while it was in unsafe position. There were no personnel dosimetry records but estimated doses were 158 mSv and 79 mSv. The device involved in the event was a Technical Operations, model TO-660 serial number 653, with a 19,79 Ci (733 GBq) Ir-192 source.

The incident took place because the operator failed to follow the required operational procedures on radiation protection for mobile gammagraphy activities. This produced the following deviations:

- The operator did not receive from his supervisor a prior assessment of the work to be carried out describing the associated risks and specific requirements on radiological protection, including the need to optimising doses. Such prior assessments have been required by law in Spain since 2001.
- The operator worked all the time without a radiation monitor, so it was not possible for him to know whether the radioactive source was in a safe or unsafe position.
- Both the operator and the assistant were not wearing an individual dosimeter, so it was not possible to determine the doses received.

❑ **Lessons Learnt**

CSN considers that special attention is needed on the following issues, to prevent similar incidents occuring:

1. The radiological protection supervisor responsible for each job (mobile gammagraphy), shall prepare a prior assessment to inform the operators of the associated risks and specific radiation protection requirements to be followed.

2. Operators and assistants shall carry out every job in accordance with well-established operational procedures.
   These operational procedures shall include provisions to prohibit starting any work until equipment for detecting and measuring radiation (radiation monitor and personal dosemeters), are fully operable.

3. An additional effort shall be made to improve refresher training on radiological protection for operators and assistants, in order to assure they understand and recognize the importance of carrying out the work in a safe manner, to protect not only themselves but also the general public.

ALARA NEWS

❑ **HEIR 2004**

9th International Conference on Health Effects of Incorporated Radionuclides - Emphasis on Radium, Thorium, Uranium and their Daughter Products
http://www.gsf.de/heir/

This conference continues a series of eight previous conferences mainly on health effects of Radium and Thorotrast which took place in Alta, Utah (1974), Neuherberg (1976), Lisbon (1977), Lake Geneva , Wisconsin (1981), Neuherberg (1984), Bethesda , Maryland (1988), Heidelberg (1994) and Tokyo (1999). The ninth conference will address subjects related to the toxicity of a-emitting radionuclides in man, including molecular and epidemiological studies, measurement and bioassay methods relevant for human populations. It will also cover studies related to naturally occurring radionuclides and to sites of environmental contamination by a-emitting radionuclides as well as health effects arising from applications of depleted uranium. New aspects in radionuclide therapy using a-emitters will also be addressed.

❑ **IM 2005**

European Workshop on Individual Monitoring of Ionising Radiation
April 11 - 15, 2005
Renaissance Penta Hotel - Vienna / Austria
http://im2005.healthphysics.at/

The program will cover aspects of both external and internal dosimetry:

External and internal dosimetry
- Directives, standards and recommendations
- Harmonisation of individual monitoring within the EU
- Radiation protection quantities
- Integration of monitoring for internal and external exposure
- Calibration/Intercomparisons and performance/type tests
- Quality assurance of individual monitoring
- Dose record keeping

External dosimetry
- Recent development of passive dosemeters
- Active (electronic) dosemeters
- Dosimetry in mixed radiation fields
- Characterisation of workplaces
- Uncertainties of external dose assessment
- Monitoring of cosmic radiation

Internal dosimetry
- Developments in in-vivo and bioassay measurements
- High sensitivity measurements: activity or mass
- Assessment of internal doses on the basis of measurements
- Uncertainties in internal dose assessment
- Radon exposure

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