European ALARA Network
http://ean.cepn.asso.fr/
Issue 17 - August 2005

European ALARA Newsletter

Editorial

As decided by the European ALARA Network Steering Group last December EAN intends to expand networking actions into the medical field and to encourage the involvement of all concerned stakeholders in developing, adapting and implementing the ALARA principle in that field. Therefore contacts have been made by EAN for collaboration with two organisations: the European Federation of Organisations for Medical Physics (EFOMP) and the European Committee of Radiographers and Radiological Technologists (ECRRT). These two professional organisations have responded positively to our proposal:

"EFOMP would like to manifest…its appreciation to the kind invitation made by EAN to act jointly in order to improve the Radiation Protection in the European Countries and will participate together with EAN to develop work or research projects in this area and particularly to facilitate the diffusion of a good radiological protection culture amongst all stakeholders concerned by medical exposures" and "By the present we confirm that ECRRT/ISRRT will support and cooperate in the field of radioprotection with EAN in Europe".
Following these first contacts, the three organisations will decide in the near future the details of their cooperation. These should include regular exchanges of information, setting up of working groups and workers panels at national and international levels, and elaboration of a joint medical European ALARA sub-network proposal.

As announced in the last issue of the Newsletter, a legal entity for managing the network co-ordination and financing in a self sustainable way has now been set up; the new Co-ordination Charter, which is presented in that issue has therefore been modified accordingly.

The issue also presents:

- the main results of a survey performed amongst all European countries on the legal and practical implementation of the "outside workers Directive" that will lead to the organisation of an EC workshop at Luxembourg next November;
- a summary of a doctoral thesis on optimization of dose versus quality of images in cardiovascular radiology.

It is still time to advertise the 9th EAN Workshop that will take place in Augsburg, Germany, 18-21 October 2005. It will be devoted to the "Occupational Exposures to Natural Radiations". The following 10th Workshop will take place in Czech Republic in 2006; it will focus on feedback from ALARA implementation during the last decade and challenges for the future. It will then be a good opportunity for a last discussion on the ICRP document on the optimisation of protection, which is presented by Dr Weiss in that issue.

C. Lefaure
EAN Coordinator
Email: lefaure@cepn.asso.fr

Contents of Issue #17

Coordinated by CEPN,
European ALARA Newsletter ISSN 1270-9441
ROUTE DU PANORAMA, BP 48 F - 92263 FONTENAY-AUX-ROSES CEDEX TEL: +33 1 58 35 74 67
FAX: +33 1 40 84 90 34 E-MAIL: SEC@CEPN.ASSO.FR

A Cooperation Charter and a Legal Entity for the European ALARA Network: a new Step in EAN's Life

C. Lefaure, P. Croüail, P. Shaw (EAN bureau members)

In June 2005, after nine years spent within the scope of the research programs from the European Commission, the EAN Steering Group has unanimously adopted a Cooperation Charter (available on the EAN website under the title Terms and Conditions) for defining the new goals and means for the next decade, and decided to set up a legal entity for managing the network co-ordination and financing in a self sustainable way. The legal entity has been set up in July 2005 as a not for profit association, called "Réseau ALARA Européen, European ALARA Network, EAN" registered under the French law. This article describes the main features of the new EAN.

EAN MAIN OBJECTIVES

The Cooperation Charter, which is now the main contractual agreement between all institutes participating to the management of the network, describes the basis on which the network is founded:

- The ALARA principle, is of vital importance to the radiation protection of workers, public and patients but there is still progress to be made in its implementation.
- All countries have a common interest in further developments and improvements of training standards, monitoring systems or techniques, schemes for control and inspection, feedback systems on incidents and source control, as well as research projects on ALARA implementation.
- The exchange and analysis of information on individual and collective radiation doses, as well as on existing dose-reduction techniques and measures, is essential for effective radiation protection programs
- A system based on international cooperation and networking with all concerned stakeholders, would facilitate the development and dissemination of a radiological safety culture and thus enhance the protection of workers, public and patients, both in routine operation and emergency situations

The charter then specifies the main objectives of EAN, which are to:

- maintain, enhance and develop competence in radiation protection with special emphasis on the implementation of the ALARA principle for occupational, public and patients exposures both in routine operations and emergency situations;
- contribute to the harmonisation of radiation protection policies and practices, particularly concerning ALARA, both at regulatory and operational levels within European countries;
- contribute to the integration and effective co-operation of expertise in radiation protection that is available in the European countries; and
- cover all types of practices within the different sectors: nuclear, industrial, medical, research, and work with naturally occurring radioactive materials (NORM).

EAN MAIN ACTIVITIES

Once a year, the EAN aims to organise a workshop on a subject, where significant improvements in terms of ALARA implementation may be found. At the end of each workshop, recommendations addressed to relevant stakeholders are issued. The next two workshops will focus on "Occupational Exposure to Natural Radiation" in October 2005 in Augsburg, Germany, and on "ALARA from Theory towards Practice: the last 10 years, and the problems to be solved in the next 10 years" in 2006.

The EAN establishes and co-ordinates sub-networks or working groups to improve feedback, and encourage the involvement of end users (e.g. the workers, public and patients representatives) in their radiological risk management through panel groups and other initiatives. One sub-network for research reactors exists already. Two new sub-networks will be set up before the end of 2005: one on industrial radiography with the EFNDT (European Federation of Non Destructive Testing) and one on NORM. Two others are envisaged in 2006, one for radiological protection regulatory bodies, and one on the medical sector with EFOMP (the European Federation of Organisations for Medical Physics) and ECRRT (the European Committee of Radiographers and Radiological Technologists).

The EAN will publish the European ALARA Newsletter every six months. It includes descriptions of incidents and lessons learned, workshops recommendations, example of good practices, experts view points and ALARA information. An EAN website is maintained, to enable a broad public access to the EAN information and publications such as the Newsletters, material and recommendations from the workshops, from EAN sub-networks and from panel groups.

EAN can also assist and co-operate with new regional ALARA and other radiation protection networks in other regions.

The network activities are open to every individual or institute, belonging to European countries. Participation to EAN activities is on a voluntary basis.

EAN MANAGEMENT

EAN is coordinated by a Steering Group comprising one nominated institute-member per country. At the moment 18 countries are represented. CEPN (France) and HPA-

RPD (formerly NRPB, UK) act respectively as coordinator and assistant coordinator of the Steering Group. The Steering Group members may be any type of stakeholder concerned with radiation protection (regulatory body, utility, research centre, trade union….). The Steering Group decides the work programme and planning of the network activities; it shall in particular:

- select the topics for the EAN workshops;
- decide the contents of the ALARA Newsletters and EAN website; and
- discuss topical issues or events relevant to European radiation protection practices, create new sub-networks on these topics and decide new actions for the EAN.

Several countries have decided to financially support EAN coordination, while others will support specific EAN actions such as workshops. Those institutes financially supporting the coordination of EAN are members of the EAN Administrative Board as well as the coordinator and assistant coordinator. A close link with the European Commission will be pursued, e.g. with the Directorate General Energy and Transport through the support of sub-networks in several domains of concern (Non Destructive Testing, NORM, medical…). In addition, the International Atomic Energy Agency (IAEA) will support the participation of representatives from non-EAN countries to EAN workshops and agreements will be set up with IAEA to co-operate, and ultimately merge with another network of Eurasian countries (see news from P. Deboodt page 9).

THE FUTURE OF THE EAN NETWORK

At the signing of the co-operation charter, the Steering Group identified the following challenges for the network:

- to develop and adapt the implementation of the ALARA principle, in respect of occupational, medical and public exposures;
- to encourage the involvement of new categories of stakeholders by means of panels and other appropriate techniques;
- to specifically expand network actions in the medical field and in the field of material containing natural radioactivity (NORM).

Implementation of the EC Council Directive 90/641 EURATOM

L. Vaillant, C. Lefaure (CEPN, France)
K. Schnuer (EC/DG-TREN)

OBJECTIVE OF THE SURVEY

The purpose of Council Directive 90/641/Euratom is to ensure that the standard of radiological protection for workers belonging to contractor firms (outside workers) is equivalent to that offered to those workers permanently employed by the operators of controlled areas. Since its publication, a new BSS Directive has been issued and the context has evolved leading to a possible revision of the Outside Workers Directive. Therefore, the Directorate General for Energy and Transport (DG TREN) has awarded a contract to the Nuclear Protection Evaluation Centre (CEPN) to carry out a survey on this topic amongst European countries' regulatory bodies, operators and outside undertakings. The objective of this survey was to identify problems, regulatory gaps and inconsistencies.
Regulatory Authorities, Operators and Outside Undertakings, from both EC Members States, as well as Candidate and Associated Countries, took part in the survey. Data from 28 countries were collected, among which answers from 26 Regulatory Bodies, 19 Operators and 5 Outside Undertakings were provided.

IMPLEMENTATION OF THE COUNCIL DIRECTIVE EURATOM 90/641 IN THE EC COUNTRIES REGULATION: CURRENT SITUATION

The first result of this survey is that the outside workers population in European Countries is estimated to be, at least 100 000 people (those data were recovered though the answers to the questionnaire and the ESOREX network - European Study on Occupational Radiation Exposure, www.esorex.cz). In countries with nuclear installations, almost all the outside workers are recorded as being associated with the nuclear field. It is quite probable that there are a few thousands working in the medical sector and non-destructive testing areas. The only exception seems to be Germany where most outside workers are recorded in the non-nuclear industry. This may be simply because the definition of working sectors in Germany is different. It has also been pointed out that there may also be a few thousands outside workers from medical device supplier companies who perform maintenance in medical facilities within Europe.
According to the Regulatory Bodies, the Directive 90/641/Euratom has been completely implemented in most of the answering countries, except for France, Norway, Slovakia and Turkey. In France, the Authority stipulated that there is no operational network for the recording of outside workers exposure information and

that there is no regulatory definition for the term "outside worker", but the SISERI - Ionizing Radiation Exposure Monitoring Information System - database is now becoming operational. Furthermore, a few years ago, the major French nuclear operators created an "access passport" to track (amongst others things) outside workers' exposure. In Norway, the directive is not considered implemented, but the general radiation protection regulations clearly cover outside workers. In fact, Norway, like Sweden in the past, considers that there is no difference between "outside" or "inside" workers - basically, there are just the exposed workers - and thus have not estimated that a specific text in their national regulation devoted to radiation protection of outside workers was needed.

The implementation of the Directive Euratom 96/29 has had an influence on the outside workers' regulation in 11 countries. Some specific standards have been issued in Spain in order to adapt the requirements of Royal Decree 413/97 to the provisions of the new European BSS. In Slovenia and United Kingdom, the outside workers' regulation did not really change, but it was integrated into the "general" radiation protection regulation. In Estonia, Poland, Malta and Latvia, the EC Directive 90/641/Euratom was implemented after or at the same time as the EC Directive 96/29/Euratom. The Finish regulation has extended the provisions detailed in the Outside Workers Directive to workers exposed to natural sources.

A rather important topic dealing with legal responsibility was outlined though this survey. The term "operator" is not defined in the previous 1980 BSS Directive (Council Directive 80/836/Euratom). A definition is provided in the Council Directive 90/641/Euratom: operator means any natural or legal person who under national law, is responsible for a controlled area in which an activity required to be reported under Article 3 of Directive 80/836/Euratom is carried on. The term "outside undertaking" is defined in both Council Directive 90/641/Euratom and the 1996 BSS Directive. Those definitions are different:

- Directive 90/641: outside undertaking means any legal or natural person, other than the operator, including members of his staff member, performing an activity of any sort in a controlled area,
- 1996 BSS Directive: an outside undertaking is any natural or legal person who carries out the practices or work activities referred to in Article 2 and who has the legal responsibility under national law for such practices or work activities.

The second definition, provided by the new BBS, raises a problem of responsibility between the operator, who "is responsible for a controlled area […]" and the outside undertaking, "who has the legal responsibility under national law […]". In case of a revision of the Council Directive 90/641/Euratom, this contradiction should be clarified.

NATIONAL REPORTING AND RECORDING SYSTEMS

According to the Regulatory Authorities that answered the questionnaire, 14 countries have implemented a reporting and recording system. 21 countries have answered (answers from regulatory bodies and others) that they have issued an individual radiological monitoring document (passport). The non-transferability (from a worker to another) and non-plurality (no worker with several passports) of the passport document are required by most of the answering Regulatory Bodies. Furthermore, national individual documents can also be issued to follow foreign outside workers (14 countries out of 24 answers) and native outside workers performing their job in a foreign country (14 countries out of 24 answers). Regarding this question, it was unanimously expressed that a uniform passport for all the EC countries, written in national language and English would be undoubtedly a step forward.

OPERATIONAL IMPLEMENTATION OF THE COUNCIL DIRECTIVE EURATOM 90/641

From an operational point of view, almost all the operators who deal with outside undertakings (mainly nuclear operators):

- check the medical surveillance requirements for outside workers;
- provide them with specific training in connection with the work and the radiological characteristics of the working area;
- ensure that protective equipment is provided to each outside worker and that exposure monitoring and assessment doses are carried out; and
- 75% ensure that the radiological data of each worker are recorded into a radiation passport or a network. Additionally, 50 % of the operators set up dose constraints and intervention level for outside workers. Most of the time, the operator requires the collaboration of outside undertakings to help achieve the optimisation of radiation protection.

The outside undertakings who answered confirmed that they provide their workers with appropriate information and training on radiation protection and ensure the assessment of exposure and the medical surveillance of their workers are implemented. Answers provided by outside undertakings clearly outline that there is a large variation in approach and, as a consequence, a real need in Europe for a harmonization of practice for both exposure assessment and medical surveillance.

The necessity for a uniform European network or radiation passport is particularly outlined through this work, however, there is no clear consensus on how this European reporting system might work in practice.

EC DGTREN SEMINAR

"The Implementation of Directive 90/641/EURATOM on the Radiation Protection of Outside Workers"

Luxembourg, 29th and 30th November 2005

The objective of this seminar is to summarize the above-presented survey, and to establish a set of recommendations to be addressed to the European Commission.

APPLICATION FORM

The Programme Committee reserves the possibility of limiting the attendance to 80 participants

Name _____
Company _____
Address _____
_____
_____
Telephone _____
Telefax _____
E-mail _____

Work in small groups is an essential part of the seminar. Please indicate, for each of the three topics, your preference (from 1 - very interested in to 3 - fairly interested in):
□ Radiological passport: monitoring, reporting and recording of ionizing radiation exposure
□ Outside workers' radiation protection in non-nuclear sector
□ Responsibility of the outside workers' radiation protection

Please send this form by postal or electronic mail before **30 September 2005** to both:

Klaus Schnuer
European Commission DG Energie et Transport
Bât. EUROFORUM - EUFO 4154
L-2920 Luxembourg Grand Duché
Tel: +352 4301 36388
Fax: +352 4301 34646
Email: klaus.schnuer@cec.eu.int

Ludovic Vaillant
CEPN
Route du Panorama - BP 48
F-92263 Fontenay-aux-Roses CEDEX
Tel: 33 (0) 1 58 35 76 43
Fax: 33 (0) 1 40 84 90 34
Email: vaillant@cepn.asso.fr

PRELIMINARY AGENDA

November the 29th:
SESSION 1 (*Chairman: A. Janssens*)
Introduction, *A. Janssens (DG TREN)*
The EC Directive 90/641/Euratom and its articulation with the 96/29 BSS, *K. Schnuer (DG TREN)*
General overview (non nuclear sectors) of the outside workers EC legislation, *DG Employment*
Results of a survey on the implementation of EC Directive 90/641, *L. Vaillant (CEPN)*

SESSION 2 (*Chairman: M. Gustafsson*)
Introduction of the topics to be discussed during the working groups sessions
Radiological passport:
- The situation in Spain and the questions to be solved, *I. Amor (CSN)*
- The Finish and Swedish bilateral arrangement, *O. Vilkamo (STUK)*
- Position of a European occupational medicine specialists' group on "the medical aspects of a European radiological Passport", *D. Depiesse (EC ISPRA)*

Responsibility and European accreditation of outside undertaking:
- The situation in Czech Republic, *K. Petrova (SUBJ)*
- The situation in France, *A. Bontemps (CEFRI)*
- Point of view of a lawyer, *(EC)*

Working groups' session

November the 30th:
SESSION 3 (*Chairman: A. Mastauskas*)
Presentation of the results of the working group sessions, recommendations and discussion, *Rapporteurs*
Synthesis of the results, *DG TREN*

Optimisation of Protection - Broadening the Process

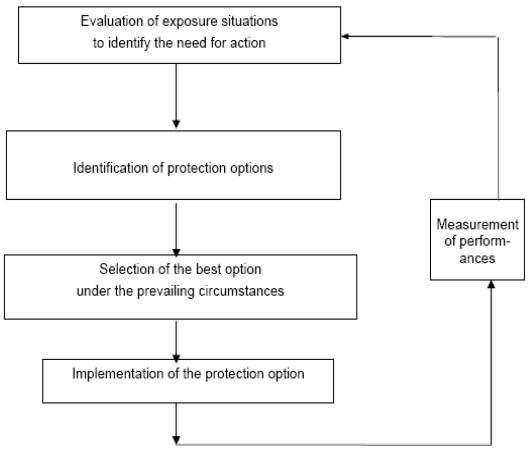
W. Weiss
(Chair of the ICRP Task Group on Optimisation)

In the system of radiological protection, the role of optimisation is an essential complement to the primary requirement that quantitative individual dose restrictions provide a basic level of protection. This basic level is achieved through source-related dose constraints, which are upper bounds to the optimisation process. The process of optimisation involves evaluating and, where practical to do so, incorporating measures that tend to lower radiation doses to the public and to workers under the prevailing social and economic circumstances. The definition of the optimisation process given in *Publication 60* remains valid, but the new ICRP recommendations stress that conceptually the process is broader. It entails consideration of the avoidance of accidents and other potential exposures, involves the adoption of a safety culture, and incorporates a range of qualitative and quantitative approaches.

CHARACTERISTICS OF THE OPTIMISATION PROCESS

Optimisation of protection is a process that is at the heart of a successful radiological protection program. It is forward-looking, aimed at preventing unnecessary exposures before they occur. It is ongoing and iterative, taking into account both technical and socio-economic developments, and requires both qualitative and quantitative judgements. The involvement of those parties who have interests and concerns about a situation provides an important input to the process. Thus, while quantitative methods provide an input to optimisation, they should never be the sole input given the many qualitative factors involved.

SCHEMATIC VIEW OF THE OPTIMISATION PROCESS



The transparency of the process requires that all relevant information is provided to the involved parties, and that documented traceability is integral to the decision making process, aiming for an informed decision. The endpoint of the process is the most appropriate protection option under the prevailing circumstances, duly taking into account the views developed by stakeholders during the decision framing and the decision making processes.

Depending on the situation, the endpoint of the optimisation process could be close to or well below the appropriate constraint. Exclusion or exemption levels should not be considered as relevant endpoints to optimisation.

OPTIMISATION AND EXPOSURE DISTRIBUTION

The comparison of protection options involves the consideration of dose distributions for all groups of exposed individuals. Each group can be distinguished by attributes that include characteristics of the population such as age, gender, habits, by exposure characteristics such as mean, deviation, minimum and maximum individual dose, the number of individuals exposed, the likelihood of incurring the exposure, and the total group dose, among others. Additional attributes that may be considered are the social values that enter into the judgement such as equity and intergenerational issues. For occupational exposure the establishment of the individual dose distribution associated with an exposure situation is relatively easy to achieve. For public exposure, access to individual exposure characteristics is in most cases very limited, and surrogates must be used. A single attribute or exposure characteristic is generally insufficient to compare fully protection options.

The distribution of group exposures has historically been characterised using the *collective dose,* defined as the product of average dose and number of exposed individuals. The value of collective dose is limited, however, particularly in the case of public exposures distributed over extremely long times and vast areas.
The Commission now recommends the disaggregation of the distribution of individual doses related to exposures from a given source. This separates the dose distribution into different components, reflecting the attributes and the exposure characteristics of the exposed individuals, and the time and space distributions of exposures relevant for the decision making process.

The disaggregating process results in a set of exposure characteristics and attributes that can be constructed on a case by case basis. To define these elements, the most straightforward approach is, very often, to ask ‘when, where, how and by whom are exposures received’. In some situations, e.g. those having far-future

components, the definition of the elements may be driven by ethical and intergenerational issues.

A representative list of useful aspects to be considered is presented in a foundation document of the new ICRP recommendations, which has recently been published on the ICRP website for public consultation. The relative importance of each element can be individually assessed based on the relevant considerations of those involved in the decision-making process. The transparency of the process, with a clear separation of the various attributes, characteristics and values considered to compare the protection options, is an important aspect for confidence in the final decisions.

THE APPLICATION OF OPTIMISATION IN OPERATION AND REGULATION

Both operators and the appropriate national authority have responsibilities for optimisation.
Operators design, propose and implement optimisation, and then use experience to improve it further. Authorities require and promote optimisation and may verify that it has been implemented effectively. An active safety culture is the key to the successful application of optimisation. This implies that there is a need for national policies, priorities, rules and procedures to ensure that a vibrant safety culture exists at all levels of management and the workforce. The focus of the regulatory authority should be to determine whether there is an effective, appropriately supported and functioning program and safety culture that promotes the finding of optimum solutions to manage doses effectively for each exposure situation.
Except in cases of regulatory violation, it is not the role of the regulator to focus on specific outcomes for a particular situation, but rather on processes, procedures and judgements. An interactive dialogue must be established between the authority and the operator. The success of the optimisation process will depend strongly on the quality of this dialogue. Depending upon national governmental and regulatory structures and schemes, and upon the nature of the situation requiring a decision, this approach can be implemented differently, as necessitated by different legal systems and approaches.

***Editorial Board Note*: AN ON GOING DISCUSSION PROCESS**

The discussion process on the above mentioned document is still ongoing. A first version was available on the ICRP website last spring; a new version, taking care of the comments is in preparation. It will be made available on the ICRP website next Spring for a second set of comments. The next issues of the EAN Newsletter will give opportunities for publishing comments and points of views. As well the 10th EAN Workshop in 2006, being devoted to ALARA implementation will be an opportunity for clarification and late discussion on that document, which should be published end of 2006.

Optimization of Patient Doses linked to Image Quality in Vascular Radiology

Laura Struelens
Promotor: *Dr. R. Van Loon (VUB)*
Copromotors: *Prof. Dr. H. Bosmans (KUL) and Dr. F. Vanhavere (SCK•CEN)*

Vascular radiology includes procedures in which the radiologist or other medical specialist uses the radiological image to diagnose or treat a specific vascular structure. In the published MIRA-2004 report (Milieu- en natuurrapport Vlaanderen) [1] it is mentioned that in 2001 diagnostic vascular procedures comprised only 0.9% and the interventional (cardiology) procedures only 0.4% of the total number of performed radiological medical examinations in Flanders. Notwithstanding that the frequency is low, their contribution to radiation exposure in medicine is considerably higher in respect to all X-ray examinations.

Due to the complexity of these procedures, the application of the ALARA-principle, keeping doses as low as reasonably achievable without jeopardizing image quality, is a great challenge. It is obvious that optimization of patient doses necessitates a reliable insight in dose levels associated with the different examinations. However, in Belgium there is a great lack of quantitative data in vascular radiology and no explicit instructions are available on how the work could be done practically. Therefore, the first purpose of the study was to define, to measure and to calculate doses to patients in 7 different hospitals.

In the thesis, patient doses are measured and calculated for 3 specific vascular procedures: angiography of the lower limbs, angiography of the carotid arteries and cerebral embolisations. The doses are evaluated against different technical parameters of the equipment and of the working procedure. For optimization purposes, a protocol for performing dose audits in vascular radiology is suggested. From the results and conclusions in this study, some practical guidelines could be given for the radiological protection of the patient.

For 158 patients, relevant parameters as tube voltage (kVp), tube load (mAs), field size, number of frames, fluoroscopy times etc. were recorded. With a flat ionization chamber, positioned in the radiation beam, the product dose*field area (DAP) was measured for every beam projection separately. Skin doses were measured with thermoluminiscent dosimeters (TLDs) attached to the skin of the patient. These measurements confirmed that radiation doses are high and that for every procedure a large dose variability exists between the different hospitals and between the patients within one hospital. The quantification and analysis of patient doses for procedures of this kind was not easy, as the

procedures are complex and not performed frequently. The study also taught us that 'effective dose' is a useful quantity to estimate with regard to dose optimization. The effective dose is the weighted sum of organ doses and therefore cannot be measured directly. By means of the Monte Carlo computer code, new and appropriate conversion coefficients were determined for the calculation of effective dose for vascular radiology procedures. If every beam projection in the procedure is considered separately, the calculation of effective dose is very complex and only suitable for studies with a small amount of patients involved. For that reason, a practical method to calculate the effective dose was also worked out, for which only one conversion coefficient is used in combination with the total DAP-value of the procedure.

Different national and international organizations have recommended the use of patient dose audits in diagnostic radiology as a means of interinstitutional comparison and the establishment of reference dose levels. Several studies [2,3,4] indicated that the performance of dose audits could reduce the difference between the highest and lowest measured dose by a factor of 2. Because of the high doses associated with vascular radiology, dose surveys could be of obvious benefit, but will not be straightforward due to the complexity of the procedures. The thorough analysis of the patient doses against all possible technical parameters of the equipment and the work procedure made it possible to set up a protocol for the performance of dose audits in vascular radiology. We propose to register, in addition to the total DAP-values, parameters as total number of frames, average kVp and filtration. These data can be used to set diagnostic reference levels (DRLs) or to compare them with existing DRLs per procedure. The information about the energy spectrum of the radiation (kVp and filtration) also makes it possible to estimate the effective dose.

Finally, the extensive dose analysis leads to the proposal of some practical guidelines, in order to restrict patient dose, while maintaining an appropriate image quality. Although the current digital systems for vascular radiology need a lower radiation intensity compared to the conventional film-screen systems, it was found that in practice many more images were taken with the digital systems. If the number of frames is sufficiently reduced and if an appropriate dose level is set at the entrance of the image intensifier, depending on the type and the purpose of the procedure, the dose could already be substantially reduced. Although such guidelines can be raised by medical physicists, it will remain the choice of the radiologist if and how they will be implemented in practice. Keeping the medical staff informed and alert about radiation protection is therefore an important issue in the process of optimization.

REFERENCES

[1] MIRA (2004) Milieu- en natuurrapport Vlaanderen, Achtergronddocument 2004, Ioniserende straling. Vanmarcke H., Eggermont G., Mol H., Brouwers J., Vlaamse Milieumaatschappij, http://www.milieurapport.be

[2] D. Hart, B.F. Wall, The UK National Patient Dose Database: now and in the future, The British Journal of Radiology, 76:361-365 (2003)

[3] NRPB, Patient dose reduction in diagnostic radiology. Documents of the NRPB, Chilton, UK, 1990; 1(3)

[4] D.L. Miller, S. Balter, et al., Radiation Doses in Interventional Radiology Procedures: the RAD-IR study, Journal of Vascular and Interventional Radiology, 14: 711-728 (2003)

Analysis of a Radiological Incident Case Study n° 17

P. Shaw (NRPB)

INCIDENT SUMMARY

The incident occurred in the UK, and involved a level gauge system containing a 1 GBq caesium-137 source. The source assembly fell out of the shielded housing onto the ground below. An employee subsequently picked it up and took it to a control room where it remained for almost 2 days. The presence of an unshielded source was eventually recognised by a supervisor, who was investigating the non-operation of the gauge. He immediately threw the source assembly out of the window, after which he buried it in a soft mud bank around which he set up an appropriate exclusion zone. The source was subsequently recovered (by NRPB) and placed in a shielded container.

DOSES TO WORKERS

Workers did not wear personal dosimeters. Consequently, a reconstruction of the incident, and dose rate measurements were used to estimate the doses received by the employee and the supervisor. The results are given in the table below.

Person	Estimated whole body (effective) dose	Estimated (equivalent) dose to fingers
Employee	2 – 3 mSv	300 mSv max
Supervisor	0.05 mSv	0.04 mSv max

It is worth noting that the doses received could have been considerably higher.

LESSONS LEARNED

- Gauging systems are a very common application, and it is extremely rare for the source to fall out under normal operating conditions. In this case, the source housing was subject to constant vibration, and this certainly was a major factor in a securing bolt becoming loose. This problem can readily be addressed at the design stage, for example through the addition of a locking pin. Operators should also ensure that regular checks on the integrity of source housings are undertaken, especially where harsh environmental factors exist.
- An early indication of the loss of the source was provided by the failure of the gauge system itself. Operators should be aware of this and put procedures in place to immediately check the location of the source in the event of such a failure.
- Providing employees with suitable information, instruction and training is important - even for those who do not directly work with radiation sources. In this case, simple radiation awareness training (location of the sources on site, what they look like inside and outside their containers, basic precautions, who to contact, etc) could have helped avoid any radiation exposures.

ALARA NEWS

❑ **New IAEA project on optimisation and networking** *(P. Deboodt, IAEA)*

In the framework of the Technical Co-operation Programme of the IAEA, the project RER/9/081 on "Practical Implementation of Optimisation of Radiation Protection through Regional Networking" has been launched. The main objective of this project is to support the development of a sustainable regional network, which facilitates information exchange and an integrated approach to practical and cost-effective implementation of the principle of optimisation of radiation protection in participating Member States. The future network will involve more than 25 members representing east European, Mediterranean and west-Asian countries. An experts' meeting has been held at the IAEA headquarters in July 2005. Three experts belonging to the European ALARA Network and three experts from the target countries have defined the work plan for the next 18 months as well as preparing the first workshop of the new network, which is planned to take place in November 2005. No specific theme is been defined for this meeting but the workshop will give the opportunity to the participants to present the status of the optimisation principle implementation in each country as well as their actual involvement in other networks.

❑ **The new law on protection against ionizing radiation in Croatia to meet requirements of European legislation** *(M. Novakovic, EKOTEH)*

In order to fully comply with International and European requirements, Croatian authorities have encouraged and fostered modifications to the existing system of radiation protection.

A new Law on Protection against Ionising Radiation and Safety of Radioactive Sources, which repealed and replaced a Law on the same subject has been approved by parliament.

The new Law is based on the IAEA Basic Safety Standards (BSS) and Council Directive 96/29/Euratom of 13 May 1996 Laying Down Basic Safety Standards for the Health Protection of the General Public and Workers Against the Dangers of Ionizing Radiation (Directive), provides a legislation framework and establishes a national infrastructure for radiation protection and safety.

The Law is based on the principles of justification of practices, optimisation of protection and safety, limitation of individual doses, authorisation of practices and the primary responsibility of the licensee. According to the Law, authorisation for all practices involving sources of ionising radiation is mandatory, except for excluded or exempted sources of ionising radiation. It establishes general and special measures for protection against ionising radiation and provides for systematic monitoring of radioactivity in the environment and the food chain.

The Law lays down the effective dose limit for occupational exposure, which is set at 20 mSv/y, averaged over 5 consecutive calendar years, and the effective dose limit for public exposure, set at 1 mSv/y.

The Law sets out the main principles for the protection of radiation workers: prior evaluation of risk and optimisation of protection, personal and workplace exposure monitoring and medical surveillance.

The conditions and procedure for authorisation are formulated in the Law as well as the principles for exemption. Pre-authorization is needed for practice and a licence is compulsory for sources within a practice.

The licensee, the legal or natural person who obtained the authorisation for conducting certain practice, bears primary responsibility for implementation of prescribed measures.

The legal or natural person performing practices involving ionising radiation must nominate a person responsible for radiation protection (radiation protection officer).

The major change in the new law is establishment of the fully independent regulatory authority: The State Office for Radiation Protection (SORP). Independence means that the director of the SORP is responsible directly to Prime Minister and that SORP can exercise its role without interference by any Government departments and agencies that are responsible for the promotion and development of the practices being regulated. It is also independent of registrants, designers and constructors and users of radiation sources.

The Law is a part of the efforts of Croatian authorities to adapt Croatian legislation and infrastructure to EU practice as the candidate country in order to achieve and maintain high standards in controlling radiation sources and exposures.

❑ Goodbye NRPB, Hello Health Protection Agency

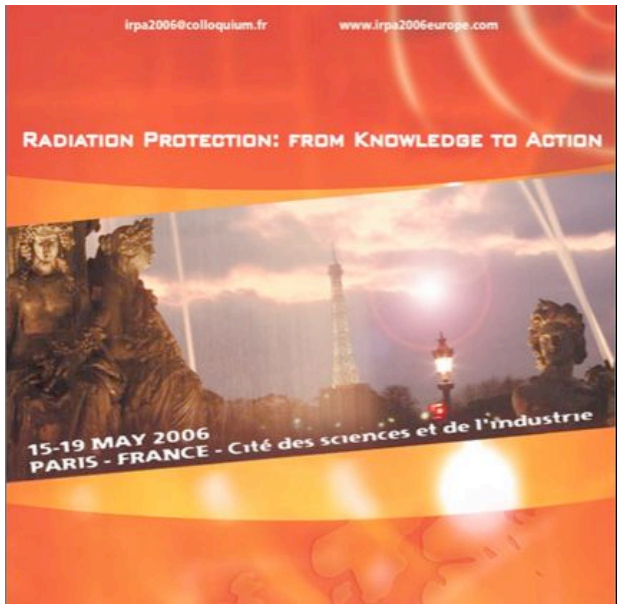
In the UK, on 1 April 2005 the National Radiological Protection Board joined the Health Protection Agency, forming its new Radiation Protection Division, whose headquarters remain at Chilton in the UK. The Chilton site is also the HQ of the Chemical Hazards and Poisons Division of HPA and, together, the two Divisions will be known as the HPA Centre for Radiation, Chemical and Environmental Hazards (CRCE). The Director of this new Centre will be Dr Roger Cox, formerly director of NRPB. The Radiation Protection Division will continue to maintain its Occupational Services Department in Leeds and Radiation and Environmental Monitoring Scotland in Glasgow.

The HPA continues all the primary functions of the NRPB. It will advance the acquisition of knowledge about protection from the risks of ionising and non-ionising radiation, and it will have a significant advisory function in the UK. The Agency will carry out research; provide clinical, laboratory and technical services; run training courses; and provide expert information and advice on risks and radiation protection issues.

NRPB was created in 1970 through the coming together of a number of UK radiation protection organisations: the incorporation into HPA represents the next step in its evolution. NRPB was one of the parents of the EAN and we are sure that readers will agree that the "NRPB brand" came to represent excellence in the field of radiation protection, both nationally and internationally. The brand may have changed, but the activities and functions continue, as does the dedication to the cause of radiation protection. So we wish the HPA Radiation Protection Division every success.

Further information on the Health Protection Agency and its role in the UK can be found at: http://www.hpa.org.uk

❑ IRPA Europe 2006



The second European IRPA Congress will be held in Paris, from May 15th to May 19th 2006, and will be organised by the French Society for Radiation Protection (SFRP). This European Congress, a global forum on the Radiological Protection field, will be a unique opportunity to submit papers on and debate about all those subjects which will determine the future of this speciality, ranging from the scientific data and questions about biological radiation effects, to the regulation and practice of radiation protection.

The program will cover different aspects:

- Biological effects of ionizing and non-ionizing radiations
- Health effects of ionizing and non-ionizing radiations
- Radiological protection systems and regulation
- Dosimetry and instrumentation
- Education and training
- Radiation protection at workplaces
- Radiation protection of patients in medical practices
- Radiation protection and the public
- Radiation protection and the environment
- Waste management and treatment
- Decommissioning and site remediation
- Incidents, accidents and post accident
- Radiation protection against non-ionizing radiations
- Evaluation of radiation protection policies
- Radiation protection and society

Abstracts must be submitted **by the 15th of September 2005** only through the IRPA website (http://www.irpa2006europe.com). Please, access the website and follow the instructions.

❑ 5th ISOE European Workshop

The European Technical Centre of the International System on Occupational Exposure (ISOE) and the International Atomic Energy Agency (IAEA) are jointly organizing the 5th ISOE European Workshop on **Occupational Exposure Management at Nuclear Facilities**. The Workshop will be held in Essen, Germany, from 15th to 17th March 2006. The OECD Nuclear Energy Agency (NEA) co-sponsors this Workshop.

The main aims of the Workshop are:

- to provide a large forum of information exchange on occupational exposure concerns; and
- to allow vendors to present their recent experiences and developments in radiation protection in a commercial exhibition. Vendors will have also the possibility to make oral presentations in plenary session room during coffee-breaks.

Abstracts should be sent to the Workshop Programme Committee by Email or by Fax.
Contact-person: Lucie D'ASCENZO, CEPN, Email: dascenzo@cepn.asso.fr - Fax: +33 1 4084 9034.

The ISOE Workshop will be preceded on the 14th of March 2006 by three meetings devoted to specific audience:

- **Senior Regulatory Body Representatives Meeting**
  (Contact-person: Olvido GUZMAN, CSN,
  Email: ogl@csn.es)
- **Radiation Protection Managers Meeting**
  (Contact-person: Heinz-Peter KAPTEINAT, VGB PowerTech e.V,
  Email: heinzpeter.kapteinat@vgb.org)
- **Research Reactor European ALARA Sub-Network Participants Meeting**
  (Contact-person: Charles JOLY, CEA,
  Email: charles.joly@cea.fr)

Further information on http://isoe.cepn.asso.fr/ - New Workshop.

❑ 10th EAN Workshop - Pre-announcement

The topic of the 10th EAN Workshop, which will be host by Czech Republic in October 2006, has been decided during the last Steering Group meeting in June. It will be devoted to ALARA "from theory to practice" covering all fields (recommendations, regulations and practices dealing with occupational, public and patient exposures). This topic will give the opportunity to look back for the last decade evolution and look forward the next decades problems to be solved.

❑ La Rochelle 2006: 4th French ALARA Seminar

The fourth French seminar on the practical application of the ALARA concept within the nuclear, industrial, medical and research fields, co-organised by the French Radiation Protection Society together with the CEPN, will be held on the 26th and 27th September 2006 in La Rochelle (France). Within a context, which has particularly evolved since 2002, mainly through the new regulatory texts in the radiation protection field, and the growing number of decommissioning sites, the efficiency of the ALARA process more and more relies on the diffusion of a practical radiological risk culture among the professionals and the public. The program will particularly focus on the following items: background for the ALARA principle; the new regulatory context and feedback experiences; development and transmission of the ALARA culture; operational dosimetry; ALARA and the design, operating, maintenance and decommissioning of facilities; non destructive testing; nuclear waste management.

The 18 EUROPEAN ALARA NETWORK Contact Persons

- **AUSTRIA**

Mr Chris SCHMITZER
Health Physics Division, Austrian Research Centers Seibersdorf, A-2444 SEIBERSDORF
Tel: +43 50550 2500; Fax: +43 50550 2502
E-mail: christian.schmitzer@arcs.ac.at

- **BELGIUM**

Mr Fernand VERMEERSCH
SCK/CEN Mol, Boeretang 200, B-2400 MOL
Tel: +32 14 33 27 11; Fax: +32 14 32 16 24
E-mail: fvermeer@sckcen.be

- **CROATIA**

Mr Mladen NOVAKOVIC
Radiation Protection, EKOTEH Dosimetry,
Vladimira Ruzdjaka 21, 10000 ZAGREB
Tel: +385 1 604 3882; Fax: +385 1 604 3883
E-mail: mlnovako@inet.hr

- **CZECH REPUBLIC**

Mrs Karla PETROVA
RC SUJB - Regional Center State Office for Nuclear Safety
Syllabova 21, CZ 730 000, OSTRAVA
Tel: +420 596 782 935; Fax: +420 596 782 934
E-mail: jan.kropacek@sujb.cz

- **DENMARK**

Mr Jens SØGÅRD-HANSEN
Danish Decommissioning
Fredriksborgvej 399, DK-4000 ROSKILDE
Tel: + 45 46 77 43 03; Fax: + 45 46 77 43 43
E-mail: jens.soegaard@dekom.dk

- **FINLAND**

Mrs Satu KATAJALA
Fortum Power and Heat Oy, Loviisa Power Plant,
P.O. Box 23, FIN-07901 LOVIISA
Tel: +358 10 455 5011 Fax: +358 10 455 4435
E-mail: satu.katajala@fortum.com

- **FRANCE**

Mr Claude BARBALAT
ASN, BP 83, Route du Panorama Robert Schuman
92266 FONTENAY-AUX-ROSES CEDEX
Tel: +33 1 43 19 71 72; Fax: +33 1 43 19 70 69
E-mail: claude.barbalat@asn.minefi.gouv.fr

- **GERMANY**

Mrs Annemarie SCHMITT-HANNIG
BfS – Bundesamt für Strahlenschutz, Fachbereich Strahlenschutz und Gesundheit, Ingolstädter Landstrasse 1, D-85764 OBERSCHLEISSHEIM
Tel: +49 1888 333 2110; Fax: +49 1888 333 2115
E-mail: schmitt@bfs.de

- **GREECE**

Mrs Vassiliki KAMENOPOULOU
Greek Atomic Energy Commission (GAEC)
P.O. Box 60092, 15310 AG-PARASKEVI, GREECE
Tel: +30 210 6506731; Fax: +30 210 6506748
E-mail: vkamenop@gaec.gr

- **IRELAND**

Mr Stephen FENNELL
Radiological Protection Institute of Ireland,
3 Clonskeagh Square, Clonskeagh Road, DUBLIN 14,
Tel: +353 1 209 69 46; Fax: +353 1 269 74 37
E-mail: sfennell@rpii.ie

- **ITALY**

Mr Mario PAGANINI FIORATI
APAT, Via Vitaliano Brancati 48,
I-00144 ROMA
Tel: + 39 06 5007 2853; Fax: +39 06 5007 2941
E-mail: paganini@apat.it

- **THE NETHERLANDS**

Mr Jan VAN DER STEEN
NRG Arnhem, Utrechtseweg 310, P.O. Box 9035,
NL-6800 ET ARNHEM
Tel: +31 26 3563370; Fax: +31 26 4423635
E-mail: vandersteen@nrg-nl.com

- **NORWAY**

Mr Gunnar SAXEBØL
Norwegian Radiation Protection Authority, Grini Naeringspark 13, Postal Box 55, N-1332 ØSTERÅS
Tel: +47 67 16 25 62; Fax: +47 67 14 74 07
E-mail: gunnar.saxebol@nrpa.no

- **PORTUGAL**

Mr Fernando P. CARVALHO
Instituto Tecnologico e Nuclear
Estrada Nacional 10, P-2686-953 SACAVEM
Tel: +351 21 994 62 32; Fax: +351 21 994 19 95
E-mail: carvalho@itn.mces.pt

- **SPAIN**

Ms. Carmen ALVAREZ
CSN, Justo Dorado 11, E-28040 MADRID
Tel: +34 91 34 60198; Fax: +34 91 34 60588
E-mail: cag@csn.es

- **SWEDEN**

Mrs Birgitta EKSTRÖM
SSI - Swedish Radiation Protection Institute,
S-171 16 STOCKHOLM
Tel: +46 8 729 7186; Fax: +46 8 729 7108
E-mail: birgitta.ekstrom@ssi.se

- **SWITZERLAND**

Mr Nicolas STRITT
Swiss Federal Office of Public Health, Radiation Protection Division, CH-3003 BERN
Tel: +41 31 324 05 88; Fax: +41 31 322 83 83
E-mail: nicolas.stritt@bag.admin.ch

- **UNITED KINGDOM**

Mr Peter SHAW
HPA – Health Protection Agency, Occupational Services Dept., Radiation Protection Division, Hospital Lane, Cookridge, LEEDS – LS166RW
Tel: +44 113 267 96 29; Fax: +44 113 261 3190
E-mail: peter.shaw@hpa-rp.org.uk

9th European ALARA Network Workshop on

Bundesamt für Strahlenschutz

"Occupational Exposure to Natural Radiation"

Augsburg, Germany
October 18 - 21, 2005

cepn

Bayerisches Landesamt für Umweltschutz Bürgermeister-Ulrich-Straße 160 86179 Augsburg

9th EAN Workshop on "Occupational Exposure to Natural Radiation"

Augsburg, Germany, 18 -21 October 2005

LAST ANNOUNCEMENT and PRELIMINARY PROGRAM

Objective

The aim of the 9th EAN Workshop is to focus on exposures arising from natural radiation sources in the workplace, in particular from naturally occurring radioactive materials (NORM), from radon gas.
There are two main themes:

- increasing the commitment to radiation protection in respect of these sources; and
- the practical approach to exposure management.

As with previous Workshops, the workshop - will consist of presentations (oral and posters) and works in small groups - and will provide all concerned stakeholders with recommendations

Preliminary Program

Tuesday 18 October 2005

SESSION 1. INTRODUCTION - *Chair: Gerald Kirchner (BfS)*

Introduction and Scene Setting, *P. Shaw (EAN)*

The EU Basic Safety Standards on Natural Radiation Sources, *E. Henrich (EC-DGTREN)*

Application of the International Safety Standards to Radon and NORM, *D. Wymer (IAEA)*

Aircrew Monitoring for Occupational Exposure to Ionising Radiation, *R. Stegemann (BfS)*

Strategies and Methods for Optimisation of Internal Exposures of Workers from Industrial Natural Sources (SMOPIE), *J. Van der Steen (NRG)*

The SMOPIE Project: Case studies with industrial partners, *P. Shaw (HPA-RPD)*

Wednesday 19 October 2005

SESSION 2. INCREASING THE COMMITMENT TO RADIATION PROTECTION - *Chair: Jose Luis Martin Mattaranz (CSN)*

Lessons Learned from Surveillance - Part 1: General Procedure for Controlling Exposure to Radon, *E. Ettenhuber (BfS)*

Problems Faced by National Authorities in Improving NORM Regulations, *V. Delporte (DGSNR)*

National Enforcement of Radon in the Workplace, *G. Thomas (HSE)*

Cost Benefit Considerations of Radon Exposure Control in Public Sector Workplaces: Potential Impact, *P Kirwan (State Claims Agency)*

Reducing Radon Exposures in Irish Above-Ground Workplaces: Regulation –v- Information, *D. Fenton (RPII)*

Substitution of Thoriated Tungsten Electrodes in Switzerland, *H. Kunz (Suva)*

Phosphorus Production and Natural Radionuclides: Consequences for the Operators Concerned, *W.H.H. Erkens (Thermphos International)*

TENORM and ALARA in the Florida Phosphate Industry, *B. Birky (Florida Inst. Phosphate Res.)*

Occupational Exposures and Distribution of Natural Radionuclides in Phosphoric Acid Production by the West Process (Spain), *JP. Bolivar (University of Huelva)*

Working Groups

Thursday 20 October 2005

SESSION 3. MANAGING EXPOSURES FROM RADON AND NORM - *Chair: Jan Van der Steen (NRG)*

Lessons Learned from Surveillance - Part 2: Measuring methods and monitoring strategies, *T. Beck (BfS)*

Occupational Exposure to Radon in French Treatment Spa Facilities, *R. Améon (IRSN)*

Investigation and Reduction of Personnel Radon Exposure Levels in Bavarian Water Supply Facilities, *S. Körner (LfU)*

Assessing Radon Exposures from Materials Containing Naturally Occurring Radioactive Material, *D. Orr (HPA)*

Assessment, Treatment and Management of NORM in the Norwegian Oil and Gas Industry, *P. Varskog (Norse Decom)*

Analytical considerations in assessment of workplaces exposed to NORM, *E. Hrnecek (ARC Seibersdorf)*

Report on the ECE II Thoron Metrology and Dosimetry Workshop, Serbia, 06-2005, *J. Mc Laughling (University College, Dublin)*

Adequacy of Existing Air Samples for Monitoring NORM Exposures, *O. Witschger (INRS)*

Working Groups

Friday 21 October 2005

SESSION 4. CONCLUSIONS AND RECOMMENDATIONS - *Chairs: Christian Lefaure, Peter Shaw (EAN)*

Presentation of rapporteurs

Plenary discussion, conclusions and recommendations

Excursion to the High Flux Research Reactor at the Technical University in Garching.

Registration Form

Please return this form by post, fax or email to:

Bundesamt für Strahlenschutz, St-SG
Attn: Marilee Williams St-SG
Ingolstädter Landstrasse 1
D-NEUHERBERG, Germany
fax: +49 1888 10 333 2122
email: mwilliams@bfs.de

Deadline: September 2005

I. Participant information

Full Name: _____

Affiliation: _____

Address: _____

City: _____ Postal code: _____ Country: _____

Phone: _____ Fax: _____ E-mail: _____

I will present a poster ☐ **Yes** ☐ **No**

Author's name(s) _____ Topic: _____

Title of Poster _____

During the workshop you will take part in one of the following working groups (please select two possibilities):

☐ Working Group 1: Types of regulation and the optimisation of protection
☐ Working Group 2: Communication and stakeholder involvement
☐ Working Group 3: Practical management of radon exposures
☐ Working Group 4: Practical management of NORM exposures

Registration, page 2 **Name:** _____

II. Registration Fee

The registration fee is 350 €, which includes workshop, workshop documents, CD with extended abstracts, evening reception on October 18th, coffee breaks, lunch in the LfU cafeteria on Wednesday, Thursday and Friday, excursion to the High Flux Research Reactor at the Technical University in Garching and bus transfer to the Munich Airport on Friday, October 21st.

Additional fee: At an additional fee of 50 €, participants can take an excursion on Saturday, October 22nd to the National Meteorological Service (DWD) Measuring Station located on the Zugspitze mountain, Garmisch-Partenkirchen. Price includes travel on the nostalgic Ammersee train to Garmisch-Partenkirchen and cog train to the top of Zugspitze (at 2.962 m, it is Germany's highest mountain peak). The tour will be conducted in English.

☐ 350 € Registration Fee

☐ I will take part in the excursion to the High Flux Research Reactor, Technical University in Garching on Friday afternoon. This requires security clearance. Please fill in the following information:

Passport #:	Citizenship:
Name on passport:	Where issued:
Place of birth:	Date of issuance:
Date of birth:	Date of expiration:

☐ 50 €. Excursion to the National Meteorological Service (DWD) Measuring Station, Zugspitze, Garmisch-Partenkirchen on Saturday, October 22nd

Total amount due: _____ €

Payment should be made in **EURO** either by **30 September 2005**

☐ Cheque posted to the address above.
☐ Bank Transfer (no credit cards).

Information for bank transfers: ALARA9
Account No: 2850168
Bank Access Code: 701 694 10

If you make a bank transfer, please ensure that **your name** (**all names** for multiple payments) appears on the message part of the transfer and that **you pay all** transfer charges.

An electronic version of this application form is available on the EAN Website: (http://ean.cepn.asso.fr - Workshop)