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Editorial

2005 saw important modifications of the EAN structure, in particular the setting up of a legal not for profit association to manage the network in a self-sustainable manner. 2006 will be the 10-year anniversary of the network, an event that will be "celebrated" in Prague during the 10th EAN Workshop. 2006 will also be the year of developing formal cooperation with other European bodies.

Contents of Issue #18

Previous EAN Workshops have focused on the optimisation principle in specific circumstances, for example for a specific work sector or particular types of exposure. The subjects have been chosen to reflect areas with potential for the further development and implementation of the concept of ALARA. As this is the 10-year anniversary of the EAN Workshops, the aim will be to consider the optimisation principle as a whole. This principle is fundamental to radiation protection, and the Workshop will aim to draw together key stakeholders to discuss its past, present and future status. In particular, the Workshop will consider the practical implementation of ALARA, and how this might be improved in the next 10 years.

EAN also intends to make use of 2006 to further develop co-operation with other European bodies. This has already started with the official signing of a letter of intention of co-operation (available on the EAN Website) between EAN and the European Committee of Radiographers and Radiological Technologists (ECRRT) in October 2005. The same proposal has been made by EAN to the European Federation of Medical Physicists (EFOMP) and to the European Federation of Non Destructive Testing (EFNDT). These three European bodies have agreed to be members of the *Programme Committee* of the Prague Workshop, where they will represent their activity sector. EFOMP and ECRRT have already met to prepare common actions in the medical field.

This issue of the Newsletter also gives us the opportunity to provide the conclusions and recommendations from two Workshops that took place at the end of 2005:

- The 9th EAN Workshop that took place in Augsburg on "Occupational Exposure to Natural Radiation"; and
- The CEPN/EC Workshop that took place in Luxembourg on the implementation and modification of the Outside Workers Directive.

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EAN 9th Workshop "Occupational Exposure to Natural Radiation" Summary and Recommendations

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WORKSHOP OBJECTIVES AND PROGRAMME

The theme of the workshop was the control of exposures received by workers from natural radiation sources. Specifically, workplace exposures from NORM (i.e. industrial materials such as ores and scales containing Naturally Occurring Radioactive Material) and from radon were considered. For completeness, occupational exposures (to aircrew) from cosmic rays were also described, but were not within the main scope of the workshop.

The objectives of the Workshop were to consider the following questions:

- How can the commitment to radiation protection be encouraged and increased? and
- How should exposure management (for NORM and radon in the workplace) be improved?

As with previous workshops, half the programme time was devoted to Working Group discussions and report backs, so that all participants could consider these objectives, contribute to discussions, and formulate the final recommendations of the Workshop.

In total, there were 23 invited oral presentations, as well as a number of poster presentations, organised under the following titles:

- Introduction and setting the scene;
- Increasing the commitment to radiation protection; and
- Managing exposures from radon and NORM (see Illustration 1).

The introductory session provided an overview of currently available data on workplace exposures to natural sources, and the EC and IAEA approaches to controlling these sources were described. In addition, a series of issues and questions, arising from the main objectives, were introduced for participants to consider throughout the remainder of the workshop. Two afternoon sessions were set aside for Working Group discussions, based on the following four topic areas:

- Types of regulation and the optimisation of protection;
- Communication and stakeholder involvement;
- Practical management of radon exposures; and
- Practical management of NORM exposures.

The reports from these groups were presented and discussed on the final day, from which the key findings and recommendations from the workshop were derived.

Individual presentations (papers and slides) are available to download from the EAN website (http://ean.cepn.asso.fr) From these, and the discussions that followed, a number of significant themes and issues emerged, and these are described below.

Illustration 1. Examples of actions taken to limit exposure to radon or NORM

Radon in water supply facilities in Bavaria [a]	*Reduction of exposure levels by a factor 10 achieved in many facilities by implementing simple and cheap actions (reducing exposure time, ventilation…)*
Thoriated tungsten electrodes in Switzerland [b]	*Substitution of the thoriated electrodes in progress*
Phosphate Industry [c]	*If it is practical to do so, dust emissions restricted or contained at the source. In storage areas, dry products coated with oils to inhibit dust.* *Use of a respirator: for most situations, a basic mist mask with a protection factor of 10 is sufficient when properly fitted and worn.* *Regarding radon, rock tunnels ventilated (by large fans) and worker occupancy times limited.* *For workers, training in the basic principles of radiation protection and risk commensurate with their exposure.*
NORM in the Oil and Gas Industry, e.g. for the workers involved in handling of LSA Scale contaminated production tubular in the Oil and Gas Industry [d]	*Essentially avoid internal exposure through inhalation or digestion: avoiding dust production, use of protective clothing and dust masks.* *"Safe Job Analysis": qualitative assessment of the risks involved in performing a certain task.*

a. ***Investigation and reduction of personnel exposure levels in Bavarian water supply facilities***, *S. Körner, C. Reifenhäuser, Session 3*
b. ***Substitution of thoriated tungsten electrodes in Switzerland***, *H. Kuntz, G. Piller, Session 2*
c. ***TENORM and ALARA in the Florida phosphate industry***, *V. Astley, B. Birky, J. Hilton, Session 2*
d. ***Assessment, treatment and management of NORM in the Norwegian Oil and Gas Industry***, *P. Varskog, H. Aamlid, Session 3*

THEMES AND ISSUES ARISING

RADON

- It is very well known in radiation protection that radon is the biggest (natural at least) contributor to population exposure. Despite this, it seems to have been given rather a low priority as a source of occupational exposure. Throughout the Workshop, the size of this radiation protection challenge was made clear. In the introduction, it was suggested that as many as one million workers could be affected, although other participants considered this an overestimate. In other presentations, there were examples of individual doses many times higher than the annual dose limits (Illustration 2). Whatever criteria are considered – number of affected workplaces; number of exposed workers; collective or individual dose – radon is the dominant occupational source.

Illustration 2. Radon as a dominant occupational source

At the beginning of the 21st century, all the 2,550 Bavarian water supply facilities were investigated with regards to radon concentration in the indoor air as well as the radon exposure to the staff working in these buildings.

Mean exposure level > 20 mSv/y (regulatory limit)	*31 facilities (1,2 %)*
Mean exposure level between 6 (Action Level) and 20 mSv/y	*43 facilities (1,7 %)*

Maximum of exposure level	*Up to 400 mSv/y*
Maximum of room concentration	*Up to 1,000 kBq/m³*

***Investigation and reduction of personnel exposure levels in Bavarian water supply facilities**, S. Körner, C. Reifenhäuser, Session 3*

- Protection from Radon is based on the principle of intervention (this applies to homes and workplaces; but workplaces that cannot meet the intervention criteria are then considered "practices"), implemented through the setting of (optimised) national Action Levels. Although this is a less rigorous system of control than is applied to other occupational sources (even NORM), the Workshop accepted that this was a pragmatic way of dealing with the worst affected workplaces. It was also noted that almost all EU Member States have issued regulations based on this approach.

- Despite the above, it would seem that the actual "success rate" is, in most cases, extremely poor. Regulations exist, but the level of compliance (and hence the degree to which exposures are controlled) is low (Illustration 3). Various reasons were suggested, but it was clear that many employers were either ignorant of the problem, or else insufficiently motivated to take action. It was clear from the workshop that improved methods of communication, especially in respect of health risks from radon, were an important first step. Various national strategies were presented, and much can be learned from the experience gained. There was broad support for both emphasising the health risk to workers, and for comparing radon against other well-known hazardous agents in the workplace (Illustration 4).

Illustration 3. Illustration of the low level of compliance of the regulation on radon

Since 2000, occupational exposure to radon in Ireland is governed by national legislation. The Radiological Protection Institute of Ireland (RPII) has encouraged a pro-active approach by employers to measuring radon in their workplaces and, where necessary, reducing exposure. During 2001 and 2002, the RPII exercised its statutory powers in directing employers, located in two towns situated in High Radon Areas, to carry out measurements in their workplaces.

Number of companies selected	*2,088*
Number of companies, which performed measurements	*408*
Number of companies, which did not perform measurements	***1,680***

***Radon in Irish above-ground workplaces: regulatory and information efforts**, D Fenton, P.A. Colgan, Session 2*

Illustration 4. Top 10 major carcinogenic agents / work processes in UK workplaces

Crystalline Silica
Radon
Passive tobacco smoke
Solar radiation
Diesel exhaust
Woos dust
Benzene
Ethylene dibromide
Inorganic lead compounds
Chemicals used in hairdressing

These agents represent 83 % of total number of employees exposed.

***National enforcement of radon in the workplace (UK)**, G. Thomas, Session 2*

- In addition, measures to encourage remedial actions are needed. Various strategies were discussed, but it was clear that the resources of radiation protection regulators are, in most cases, incapable of meeting such needs, either in terms of communication or enforcement. The need to involve the wider Health and Safety community, as well as other relevant bodies was clear. To achieve this, it was felt that a national commitment to controlling radon at work was needed.

- It was noted that radon is also a major public exposure issue, and indeed many of the points raised have relevance to the implementation of controls in homes.

- There was some discussion, but no overall consensus, on the ICRP proposals to expand the concept of dose constraints to cover planned, emergency and existing exposure situations (and thereby moving away from the concept of intervention through radon action levels). It was noted that this would place more emphasis on optimisation, however there were concerns that, in the case of radon, this would be even more difficult to implement than the current system.

NORM

Unlike radon, a harmonised approach to the control of occupational exposures from NORM has been mostly lacking. As a result, progress has been slow and the situation has been rather fragmented. Even basic data, such as the number of exposed workers, and the range of doses received, are still quite scarce. The best current estimate, as summarised in the SMOPIE project, is that approximately 85,000 workers could be affected (Illustration 5).

Illustration 5. 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 multiplied by 4*
Oil and gas production, exposure to scale dust at maintenance	*2,000*	*Based on 1,000 production installations and two workers potentially exposed annually per installation*
Other industries	*about 3,000*	*Based on industry supplied data, and various other sources*

***Strategies and Methods for Optimisation of Internal Exposure of workers from industrial natural sources (SMOPIE)**, J. Van der Steen and al., Session 1*

- The Workshop was, however, encouraged by a number of quite recent developments, including international guidance from IAEA, new national regulations and guidance on NORM, and research work such as the SMOPIE project commissioned by EC. These developments have helped define a number of key factors in the control of work activities involving NORM, i.e.:
  - NORM is widespread, and not all work activities can or should be subject to regulatory control. The use of a 1 mSv/y reference level (for workers and other persons), for determining when a work activity should be regulated, seems appropriate and is now widely adopted;
  - Application of this dose criterion should be based on *realistic* assessments of the doses that are likely to be received. Doses estimated from exposure models are often grossly pessimistic, and estimates based on actual measurements in the workplace are preferred. From these, it is then possible to compile more accurate lists of NORM materials, industries and processes that may require regulation.
  - Although many NORM industries know little about radiation protection, they are often familiar with worker protection from a wider industrial hygiene perspective. The two approaches are complimentary, and compliance with traditional health and safety controls may be sufficient to ensure that radiation exposures are also adequately controlled. Even where this is not the case, any additional radiation protection controls should, where practicable, follow the industrial hygiene ethos. In particular, a graded approach to regulation is recommended, whereby controls are applied according to the risks to workers, and reflect the practicalities of the industries concerned.

- Despite these developments, the workshop identified a number of areas where further progress was needed. In particular:
  - There remain significant uncertainties around the dose coefficients used to calculate doses from intakes of NORM. In many cases, the radionuclides are contained within inert particles, the bio kinetics of which are not well defined. Further uncertainties are associated with the way in which daughter products are assumed to behave following an intake.
  - Air sampler design is driven by industrial hygiene considerations, which do not always match the needs of radiation protection. This was considered in some detail in the SMOPIE report, and the recommendations in terms of improved air sampler design need to be taken forward.
  - There is still reluctance in some NORM industries to acknowledge the radiation protection issues, often because they see no benefit in doing so. It was considered that the radiation protection community needs to make more effort to establish an open dialogue with industry and gain their trust.
  - Despite worker protection being one of the main themes of the Workshop, there was actually very little information presented on this subject. It was hoped that the future NORM network, sponsored by EC, would be able to provide this type of information.
  - The introduction of controls on NORM has also had a large impact in terms of how the by-products, residues and wastes are viewed. In a number of cases, previously unregulated materials are now firmly categorised as

radioactive waste. Some of these materials are produced in huge quantities, and the use/disposal of residues is a major issue for a number of NORM industries.

RECOMMENDATIONS

Each working group produced conclusions and recommendations, and gave a report back on the final day of the workshop. The output of the Working Groups was collated by the EAN co-ordinators, to produce the formal recommendations of the Workshop, as listed below.

RECOMMENDATION 1: National Action Plans for Radon

National Authorities should develop long-term action plans for addressing occupational radon exposures. These plans should include:

- Goals and targets;
- Identification of stakeholders and contributors, assignment of responsibilities, and co-ordination of national authorities and resources;
- Strategies, methods and tools for measuring radon levels, and for taking remedial actions; and
- Audits and reviews of the implementation of the plan.

The radiation protection community (e.g. regulators, advisory bodies, research establishments, etc) should acknowledge the assistance that other stakeholders can provide, and actively seek to develop links and working relationships, for example, with:

- The wider Health and Safety Community;
- Employer and employee organisations;
- Insurance/legal sectors with an interest in occupational liability and compensation;
- The building and real-estate industries; and
- The media, and those with expertise in communication.

Public sector employers should be expected to lead by example in terms of implementing national plans.

RECOMMENDATION 2: Communicating the occupational radon risk

The effective provision of information on health risks from radon exposure, in a non-technical way, is essential to express the scale of the problem and the need for remedial action. Suggested approaches include:

- Estimating the risk of cancer from workplace exposures, for example in terms of the numbers or ranges of fatal lung cancers predicted per year in each country or region;
- Providing a comparison of these health risks, for example by including radon in a "Top 10" of hazardous (carcinogenic) workplace agent; and
- Associated risks, such as from compensation claims, may also help persuade employers that action should be taken.

It is recommended that National Authorities (as part of Action Plans) and also the EC should pursue this.

RECOMMENDATION 3. Communication / compliance strategies

Experience in the effectiveness of different strategies used in radon action programmes is growing. These include advertising through various media, leaflets, websites, targeted mailshots, "roadshows" and inspection campaigns. There are many lessons to be learned, and it is recommended that this experience is analysed and shared. It is recommended that the EC consider:

- Commissioning research on the effectiveness of different regulatory enforcement strategies, so that national resources can be used in the most effective manner; and
- Developing a website that provides information on radon/NORM risks, as well as communication and protection strategies, as a resource to assist Member States in implementing National Action Plans.

National Authorities should also pay more attention to this subject, especially with a view to developing mutual trust with other stakeholders, for example by:

- Engaging with credible, local information sources (e.g. medical or public health professionals) to ensure a common message;
- Setting up stakeholder panels, national forums, etc.;
- Making greater use of communication experts; and
- Review the effectiveness of their own strategies and sharing this information with others.

RECOMMENDATION 4. Targeting radon action

Radon action in workplaces needs to be prioritised, to ensure that the greatest benefit is obtained from limited resources. To help achieve this, it is recommended that:

- EC should be asked to clarify the scope of BSS Title VII, so that all Member States are clearly advised as to which type of workplaces it applies to (at present some Member States just regulate certain types of workplace (e.g. underground mines, show caves, water treatment plants, some spas), while in others the regulatory system applies to all workplaces); and
- Regulatory Authorities should identify the methods by which they can best identify priority workplaces, for example by mapping radon-prone areas, by considering specific types of workplaces/work activities, and taking account of occupancy rates. The aim then is to develop regulatory programmes and measurement

protocols to encourage radon surveys in these priority workplaces. As well as determining the need for remedial action in specific workplaces, Regulatory Authorities should seek to collate the results to provide a better national picture of the situation.

RECOMMENDATION 5. Radon in new workplaces

Enforcing radon protection (construction) standards in new buildings represents a long-term (and very cost effective solution) to the problem. Some national standards do exist, but in many cases this is only applied as guidance.

National Authorities are encouraged to set and enforce radon protection standards for new (priority) workplaces, and to periodically review progress in terms of the number of workplaces subject to these standards.

RECOMMENDATION 6. The regulation of NORM

Credible and effective regulation of NORM industries requires a graded approach that recognises existing controls for other hazards. Regulatory Authorities should ensure that the regulatory system applied to NORM:

- Focuses on significant doses; and
- Acknowledges existing regulatory controls (e.g. from an industrial hygiene perspective), where these contribute also to radiation protection.

To assist in the above, Regulatory Authorities are also encouraged to:

- Maintain up-to-date lists of materials and processes for which regulatory controls have been/are considered necessary; and
- Promote communication between different regulatory bodies, or different divisions within the same overall body, i.e. where they have an overlapping interest in controls related to worker protection.

RECOMMENDATION 7. The SMOPIE recommendations

The SMOPIE report recommendations were endorsed by the Workshop, and follow-up actions are recommended. In particular:

- ICRP is requested to review the applicability of existing dose coefficients to natural radionuclides in NORM. Depending on the outcome of this review, the Commission is requested to consider a possible revision, or expansion, of their recommendations. In particular, the issues to be addressed include the lung solubility classification of radionuclides, the intake of radionuclides contained within inactive carrier particles, and the rate of radon emanation from such particles; and
- Air sampler manufacturers and users should note the recommendations for the development of new devices, in particular the need for reliable thoracic samplers for radiation protection use.

RECOMMENDATION 8. Further guidance for NORM users

Practical guidance for NORM users has started to appear: the Safety Reports issued by IAEA, and the SMOPIE report, are especially acknowledged. Further work is, however, still recommended, and the NORM network being proposed by the EC might address this. In particular:

- Further exploration of the use of activity concentration values (Bq/g) as a practical means of indicating the need for certain actions or controls is recommended. These levels should be related to specific industrial processes, and be derived from workplace measurements and operating experience;
- A graded approach to exposure assessment, as recommended in the SMOPIE report, is supported, but needs to be tested in practice and, if necessary developed further;
- More guidance on radiation protection monitoring and control in specific NORM industries is still required; and
- Training and awareness material for workers should be developed.

Conclusions and recommendations from the Seminar on the implementation of Directive 90/641 EURATOM on the radiation protection of outside workers

(Luxembourg, 29th - 30th November 2005)

C. Lefaure, L. Vaillant (CEPN, France)

CONTEXT

In the beginning of the 1980s, the problem of outside workers' radiation protection within the nuclear facilities was raised. Those workers received 80% (and even more) of the collective dose from most nuclear facilities and typically higher individual doses than the workers of the nuclear operators. The protection of outside workers was not explicitly taken into account into the 1980 Basic Safety Standards. Consequently, the EC issued Directive 90/641/Euratom in order to ensure that outside workers would benefit from the same level of protection as permanently employed workers, and this has led to an improvement of outside workers' radiation protection. The events of the last few years - implementation of new Basic Safety Standards, enlargement of the EU as well as the increase of dismantling and waste handling activities - has lead

EC DGTREN to consider reviewing and improving Directive 90/641/Euratom.

EC DGTREN awarded CEPN with a contract to evaluate the level of implementation of Directive 90/641/Euratom into the EU national regulations as well as its operational implementation. In addition, a Seminar was held at the Luxembourg EC facilities on 29th and 30th November 2005, gathering EC representatives, national regulatory bodies representatives, operators, outside undertakings and trade union representatives in order to discuss this topic. Sixteen Member States were represented, including five New Member States. It was, therefore, the first opportunity for DGTREN representatives to discuss outside workers topics with new Member States representatives since they joined the Union.

The survey carried out by CEPN, as well as the different presentations, have demonstrated differences in national approaches to the practical implementation of Directive 90/641/Euratom, while aiming to meet the same fundamental objective: ensuring that outside workers benefit from the same level of protection as permanently employed workers.

It appears also that Directive 90/641/Euratom is, in most of the EU countries, totally implemented into national regulations in spite of what appear to be inconsistencies between some definitions provided by the Directive 90/641/Euratom and the Basic Safety Standards (1). Definitions, as well as the sharing of responsibilities, are therefore not understood in the same way from one country to another. The participants thus welcome the initiative of the Commission to integrate the outside workers' radiation protection Directive into the future Basic Safety Standards, as well as its wish to consult end users. It is also expected to maintain, in the following years, the coherence between the new Basic Safety Standards and other European legislation (for example, directives related to risk at work or directive on free movement of services).

(1) *As detailed within the CEPN survey, the term "operator" was 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" was 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*

RECOMMENDATIONS FROM THE SEMINAR

Scope and definitions of the Directive

It was proposed by several working groups that outside workers' radiation protection regulation should cover category A as well as category B workers. In fact, all exposed workers, whatever the level of dose they are to receive, should benefit from the same system of protection. A few countries have reservations about this extension, as category B workers are not expected to work in controlled area. In addition, the provisions for outside workers should be explicitly extended to non-nuclear fields - the medical and the non-destructive testing fields were the most quoted sectors.

It was also proposed to clearly define the terms "outside workers", "operator" and "outside undertaking" within the future BSS, as well as "self-employed worker". Those definitions should also be harmonised with those of IAEA. The problem of self-employed workers has been pointed out; while they are not numerous, their number is increasing. Some participants have expressed some fears concerning their monitoring and follow-up. Therefore they should be explicitly covered in the outside worker radiation protection regulation.

European radiological passport and European dose recording system

Discussions and presentations dealing with the radiological passport content and format have been numerous. This topic appears to be of high importance for all participants. Most EU countries are now providing documents corresponding to national radiological passports (issued either by regulatory bodies or other national organizations). Additionally, as reported in the CEPN survey, fourteen countries have set up national dose recording systems. Those recording systems can be implicitly devoted to outside workers (in Spain for example), or it can deal with all exposed workers (in France for example).

The setting-up of an European outside workers exposure recording system, which was expected some years ago, does not any more appear to be a relevant issue for participants. It raises several problems dealing with costs and management, its efficiency and use are not easy to foresee, and it could raise conflicting issues with regards to national data protection agencies' requirements.

In comparison, there is strong support for the EC to continue supporting the ESOREX network (www.esorex.cz). In fact, it appears as a key tool of information and feedback related to workers exposure within the EU, and as a potential promotion tool for "harmonisation" of national reporting and recording systems.

Regarding the radiological passport, all participants expect to make use of a more harmonized document, provided that it allows a sufficient degree of national flexibility. The question of language is of first importance and a radiological passport should be at least issued in two languages: the national language of the issuing country, and English.

Regulation should be flexible, but EC should define the minimal requirements for the content of the passport, allowing countries to ask for more data for workers of their nationality if they wish to. For example, EC should give guidance on what type of exposure data should be provided for workers travelling in different countries with different dose limits (20 mSv as annual calendar dose limit, 20 mSv for a 12 month rolling period, 100 mSv for a five year period…). It was noted during the Seminar that about half of the EU countries have an annual dose limit of 20 mSv, while the others have a dose limit of 100 mSv for 5 years. In addition to regulatory limits, some companies might apply a dose constraints lower than 20 mSv. However, the passports are used only as a tool to enable travelling of workers between the sites (without waiting for official dose reports). Member Countries suggest a flexible way of regulation of personal dose data information exchange.

Regarding medical data, the passport should indicate if its owner is declared fit or unfit, the date of last medical examination, the task that he/she cannot manage, and details of the medical doctor(s) in charge of the worker follow-up. It would help to ensure medical secrecy while providing the medical service of the operator with a person to contact if need be. Following the presentation by the European occupational medical physicians working group, even though more detailed medical data should not be in the passport, it is recommended that Commission note the conclusions that will be soon made available by that working group.

EC should produce guidance on ways to provide information to national authorities about doses received abroad. The Finland / Sweden system is considered as a good example. Further EC guidance is expected concerning non-EU workers and the minimum set of data they should provide to the operators in EU countries.

Some participants also suggested that the EC should support the development of an inexpensive electronic form of the passport.

Finally, it is recommended that all countries consider "mutual recognition" of their national radiological passports.

Ability of outside undertakings

Procedures that guarantee the competence of a company to perform specific jobs in controlled areas are considered important. Two main situations are encountered:

- In some new Member States, such as Czech Republic or Lithuania, the outside undertakings, being considered as undertakings in the sense of the BSS, are subject to authorisation before being allowed to work in controlled areas. The outside undertaking became then a licensee, which may be inspected by the regulatory bodies' inspectors (2).
- In most old Member States, referring to the Directive 90/641/Euratom, there is no requirement for an authorisation to be delivered to the outside undertakings. In some cases, the regulatory body registers outside undertakings in a specific registry. In other ones, an accredited body (private or public) certifies outside undertakings following an audit, the certification being "checked" every two or three years. The French certification system is an example of such a system and has been considered very interesting to participants, in particular nuclear operators.

(2) *This is the case in the Czech Republic when the outside undertaking is handling the source. But if the outside undertaking provides services such as painting or cleaning, it should be covered from a radiation protection point of view by the license of the operator.*

There are different approaches, for example in Spain, the regulatory body has created a national registry for outside undertaking. The Spanish regulation indicates that outside undertaking must be registered before starting any activity. The regulatory body is in charge of regularly inspecting outside undertakings to ensure they comply with regulatory requirements.

The procedure and content of authorisation, registration and certification by an accredited public or private body are quite different, as are the frequency and content of inspection and audits. The question of the ability of outside undertakings should therefore be further debated, under the auspices of the Commission, in order to evaluate the different procedures and to check whether they achieve the same overall aims. The question of the need for an authorisation is directly linked with the clarity of the definitions to be included in the new BSS for the outside undertakings.

Sharing of responsibilities and cooperation

Regarding cooperation between employers, the Council Directive 89/391/EEC of 12 June 1989 (Framework Directive), which has been presented during the Seminar by the DG EMPL, on the introduction of measures to encourage improvements in the safety and health of workers at work proposes an interesting framework. The objective is to set out minimal requirements to ensure that workers are protected at work. In particular, the Article 6 (General obligations of

employers), indicate that "[…] *when several undertakings share a work place, the employers shall cooperate in implementing the safety, health and occupational hygiene provisions and, taking into account the nature of the activities, shall coordinate their actions in matters of the protection and prevention of occupational risks, and shall inform one another* […]".

In the case of radiological protection of outside workers, cooperation between employers and operators, sharing of responsibilities, mutual feedback and information were discussed in detail at the Seminar. Regarding the implementation of basic principles of radiation protection, it was noted that the employer should legally remain responsible for compliance with dose limits, while the optimization of radiation protection should be managed through cooperation of both the operator (responsible for the source) and the outside undertakings. This is clearly an acceptable transposition of the Framework Directive into the radiological protection context.

As far as the practical sharing of responsibilities is concerned, the participants of the Seminar recommend the establishment of a European list of operational duties to be considered. The regulatory management of the sharing of responsibilities between the operator and the outside undertaking is not expected to be explicitly defined, as from an operational point of view it clearly depends on the context: nature of the job, size of the outside undertakings, sector… The sharing of practical responsibilities should be laid down on a contractual basis between the operator and the outside undertaking; this should cover the sharing of responsibilities between the first row outside undertaking and its sub-contractors.

Miscellaneous

Regarding trans-boundary issues, the language problem was again mentioned: how to efficiently train workers who do not speak the same language? Is it acceptable for safety and radiological protection reasons to let workers who do not speak (or read) the same language as the operator, to work in its controlled area? If not, how can it be prohibited? If yes, under what conditions can it be allowed? In addition, the importance of experience feedback was mentioned as the outside workers may miss the opportunity to inform the operator on good practices, near misses and incidents - and vice versa.

Generally speaking, a system of "mutual acceptance" of differences in interpreting European regulations should be developed.

Follow up of the Seminar

Many questions have been raised within the answers to the questionnaire as well as during the Seminar. The discussion lead to a few clear answers, but much remains to be resolved, which is not surprising regarding the numerous issues, the short time available and the fact that it is the start of a discussion process.

It is thus recommended that the EC establish an appropriate means to follow up the Seminar, for example through the setting up of a working group. Existing European networks and projects should be involved in that process as appropriate.

Analysis of a Radiological Incident Case Study n° 18

Incident involving Radioactive Lightning Conductors in Croatia

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CIRCUMSTANCES

Radioactive lightning conductors (RLC) have been used in a number of countries for several decades because it was believed that radioactive attachments improve the effectiveness of the lightning conductors. Even though these types of RLC have not been manufactured in last 10 years, many are still in regular use in Croatia and have created a number of specific radiation protection and regulatory problems. RLCs represent the largest homogenous group of radioactive sources in Croatia. These devices were classified as consumer products. The consumer products are usually covered by the general license concept with little or no regulatory control. The general license concept enables persons with minimal or no training in radiation safety to possess and use licensed radioactive sources or devices. The RLC installed in Croatia used cobalt-60 or europium-152 and 154 with activity 10 – 20 GBq, which exclude them from the consumer products category. They are treated as sealed radioactive sources.

As time has gone by, warning labels and signs on RLC often became obliterated as a result of exposure to adverse environments and improper maintenance. Also, personnel knowledgeable about the RLC retire, are discharged or otherwise leave the licensee's plant.

Not surprisingly, as a consequence of these developments and the absence of control and inspection, some of these RLC entered the public domain, most frequently by being discarded with scrap metal.

In August 2005 two radioactive sources in original lead container (open on upper side) were dismantled from

RLC installed on the roof of one hotel and sold as scrap metal. During transfers of the devices two 15 GBq europium-152 and 154 sources were dislodged from the containers. Scrap metal was exported to Italy. It was transported from Croatia via Slovenia to Italy by truck. At the Italian border during routine monitoring of the cargo on the truck transporting this scrap metal, according to Italian law procedures, the presence of radioactive material was detected. Two intact sealed radioactive sources were discovered (1 cm x 1.5 cm). No leakage of radioactive content was detected. The sources were placed in an interim storage and after some time with the consent of the regulatory authority of Croatia they were returned to Croatia and stored in the recognised storage facility.

The State Office for Radiation Protection asked for an investigation, dose reconstruction and evaluation of the consequences.

Direct measurements at the source gave 5 mSv/h maximum at a distance of 10 cm; and 1 mSv/h at a distance of 1 m. The driver and passenger were exposed to the sources as were workers who were handling the scrap metal in the scrapyard. However, only the driver and his companion were identified. They had no radiation monitor during transport. It was estimated that the dose at the driver's position was 100 μSv/h. Based on the transport time, average distance and simulation of the transport it was estimated that they received an effective dose of about 3 mSv. They were sent for a medical examination including chromosomal aberration analysis.

CONCLUSION AND LESSONS LEARNED

Lost and unwanted sources can cause safety and security problems such as radiation exposures to workers and members of the public and radioactive contamination. The described incident has not resulted in especially significant radiation exposures and no contamination occurred. Nevertheless it should be stressed that prevention of radioactive sources from entering the public domain in an uncontrolled manner has become an international challenge to authorities responsible for regulating the safe use and disposal of radioactive sources. A new specific safety problem had appeared during the 1991-95 war in some newly independent countries formed after the disintegration of Yugoslavia. Investigation showed that many RLC in war-affected areas were displaced, and some were even found buried under the ruins. These damaged RLC became available for unauthorised uses or subject to unsafe handling by the local population. Furthermore, radioactive materials could be collected by local scrap merchants and sold to scrap processing facilities. For these reasons over the past years Croatian authorities mounted campaign to locate, recover and dispose of all RLC that had been damaged, lost or abandoned. After successful completion of the campaign some specific lessons were learned from this experience that served as a basis for further actions in this field. RLCs represent the largest homogenous group of radioactive sources in Croatia but with the least regulatory control of all radioactive sources and they frequently enter the public domain in an uncontrolled manner from time to time. In order to maintain and regain full control over all radioactive sources in the country and because of some doubts about their operational effectiveness, there is now consensual decision that about 250 RLC still installed in Croatia have to be dismantled and properly stored as soon as possible. With the assistance of IAEA this project would be completed in 2006 and hopefully incidents of the type described will not happen in future.

The scrap metal recycling industries should be concerned as well, because of more and more experiences with sources becoming mixed with scrap metals destined for recycling. If the owner or the manufacturer of these sources cannot be identified or is no longer in existence, the source is considered to be an "orphan source" and the unlucky finder may be held responsible for long-term security and eventual disposal of the unwanted source. The metal scrap dealers are encouraged to establish monitoring system for radioactivity at the entrance to their scrap-yards.

In conclusion, an important lesson to be learned from the incident is that periodic contacts by regulators (for example via more frequent inspections) with users of radioactive sources serve as reminders to them of the need to maintain control and accountability of the sources, to properly dispose of the sources when they are longer needed, and to otherwise provide for their safe use. It is also necessary to give higher priority to an ongoing review of general license policies and procedures especially taking into account Directive 2003/122/Euratom on the control of high-activity sealed radioactive sources and orphan sources and Code of Conduct.

Analysis of a Radiological Incident
Case Study n° 19

Radionuclide gauges in rough industrial environments - a challenge for radiation protection

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Industrial gauges for permanent installation using radioactive sealed sources are widely used in Norway, as in the majority of other developed countries. The gauges are used to measure thickness and density of many materials and also used as level gauges. Such gauges are often well-suited and are the preferred choice when working in rough environments where other options fail due to a number of reasons; primarily heat, cold, pressure, corrosive agents, dust, dirt or vibration.

Frequently used isotopes in industrial gauges are Cs-137, Co-60 and Am-241. Depending upon the specific application, industrial gauges in some instances contain relatively small quantities of radioactive material, however in some cases activity levels can be as high as several hundred giga becquerels.

Even though the gauges are designed for many years of use in harsh environments, heat, cold, pressure, corrosive agents, dust, dirt and vibration can be a serious threat to the radiation safety and integrity of the device. From our experience in Norway during inspections, some examples of such cases are described which might give special radiation protection challenges.

EXAMPLE 1: WORN OUT BECAUSE OF VIBRATION – LOST SOURCE

In 2005, two industrial gauges supposed to contain Co-60 sources were found with serious defects. In one of them the radioactive source was missing, and has not yet been recovered.

The particular gauge model (see Figure 1), which is commonly used with no problem, was found to fail in dusty and vibratory environments after about 10 years of use.

Figure 1: The pin (~ 5mm) securing the locking mechanism to a slit in the source housing was grinded off.

When the pin securing the locking mechanism is grinded off, only the sealing will hold the shutter mechanism in place. The thin metal wire of the sealing is not meant for holding the gauge together, and is easily snatched off (e.g. by vibration).

Figure 2: For security reasons the gauge is not usually padlocked in open position, and with the pin grinded off the source holder is easily removed from the shielding.

Figure 3: The gauge with the missing source also missed the screw keeping the spring-loaded plate in place.

These serious incidents happened to a well-known gauge model. The gauge is of a so-called "Scandinavian" or "Swedish" design, and the use of this model outside Scandinavia is unknown to us. The manufacturer is now making a model specially made for vibratory environments.

EXAMPLE 2: CORROSIVE ENVIRONMENT

Some radionuclide gauges are installed in corrosive environments and rust might in turn lead to problems with the opening/ closing/ shutter mechanism.

In figure 4 an extended handle has been welded on the shutter mechanism in such a way that extra force might be used to open and shut the rusty gauge (for example with the use of a hammer). There are examples where this has led to shutter damage and the gauge has no longer been able to be put in shut position.

Figure 4: Rusty radionuclide gauge with extended handle

EXAMPLE 3: COVERED AND WORN-OUT MARKINGS AND SIGNS

In some industrial environments chemical agents might wipe out the labels and markings, or they are covered with production waste.

Figure 5: The labelling of open and shut position is worn-out.

Figure 6: Challenging environment, but in this case the gauge is protected by a mudguard and a trefoil warning sign was placed to the right of the picture.

Production waste covering the warning labels is also a safety threat, and procedures for cleaning labels regularly are important to have in place.

LESSONS LEARNED

The lesson learned from inspections is first of all that the undertakings should prepare instructions and work procedures which ensure proper cleaning and maintenance of the radionuclide gauges.

Radionuclide gauges exposed to particularly rough environments should be inspected more frequently. With the registration regime we have today, we have little information on the environment where the gauges are installed. With the introduction of electronic web-based notification of radionuclide gauges, the Norwegian Radiation Protection Authority plan to introduce questions about the installation environment.

With an enhanced inspection frequency, last but not least, **information** to the undertaking will also be an important contribution to radiation safety.

ALARA NEWS

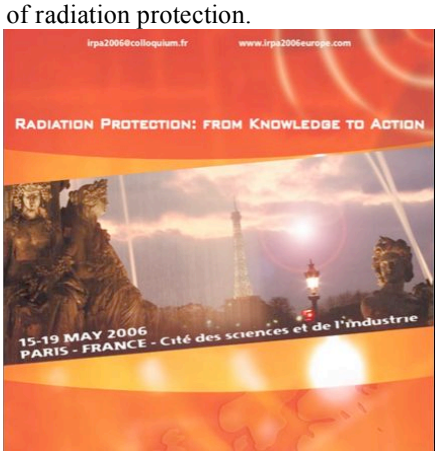
❑ Workshop on Interventional Radiology in Belgium

The Federal Agency for Nuclear Control (FANC) is organising a Workshop on Interventional Radiology. The Workshop will be held at the Radisson SAS hotel in Brussels (Belgium) on the 25th March 2006. The outcome of a two-year study, carried out in collaboration with several Belgian universities, research centres and hospitals, will be presented and discussed by a multidisciplinary panel. Special attention will be devoted to the practical implications for the daily radiological protection of patients and staff in interventional radiology and cardiology.

More information can be found on FANC Web Site: http://www.fanc.fgov.be/nl/event_interventional_radiological.htm#introduction

❑ 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 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

More information can be found on IRPA 2006 Web Site: http://www.irpa2006europe.com/

❑ 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 CEPN, will be held on the 26th and 27th September 2006 in La Rochelle (France). Since 2002, new regulations, and the growing number of decommissioning sites have meant that the efficiency of the ALARA process increasingly depends on the diffusion of a practical radiological risk culture among professionals and the public. The program will particularly focus on the following items: background of the ALARA principle; the new regulatory context and feedback experiences; development and transmission of ALARA culture; operational dosimetry; ALARA and the design, operating, maintenance and decommissioning of facilities; non destructive testing; and nuclear waste management.

❑ 3rd Scientific Seminar on calculation codes in radiation protection, radiophysics and dosimetry

The objectives of this Seminar, organised by the Technical Protection Section of the French Society for Radiation Protection (SFRP) are to establish state of art of the calculation codes and to identify future developments. This Seminar – in French – will be held in Saclay (France), from the 28th to the 29th November 2006.

More information can be found on SFRP Web Site: http://www.sfrp.asso.fr/

❑ International conference on decommissioning issue in Athens (Greece)

The IAEA, in collaboration with the Greek Atomic Energy Commission (GAEC), is organising an international conference on "Lessons Learned from Decommissioning of Nuclear Facilities and the Safe Termination of Nuclear Activities". This conference will take place from 11th to 15th December 2006 at the Athens Hilton. The objective of the conference is to promote information exchange on the safe and orderly termination of practices that involve the use of radioactive substances and to promote improved coherence internationally on strategies and criteria for the safe decommissioning of nuclear facilities.

More information can be found on IAEA Web Site: http://www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=143

Practical information will soon be available on GAEC Web Site: http://143.233.238.6/en/index.html

❑ 10th EAN Workshop Web Site

A Web Site dedicated to the 10th EAN Workshop on "Experience and new developments in implementing ALARA in occupational, public and patient exposures", which will be held from 12th to 15th September 2006 in Prague (Czech Republic), has opened. This Web Site gives all the information needed about the Workshop: announcements, program, accommodations… If you wish to participate to the Workshop, you have to register on the following Web Site.

http://alara06.jaderne.info/

❑ Contrôle N°167: The international radiation protection: international actors

The 167th issue of the French authority DGSNR journal is dedicated to the international organisations devoted to radiation protection. This edition brings together the points of view of the different organisations, which contribute to radiation protection in the world, and examines three complementary levels of harmonisation: the shared concepts, the recommendations and regulatory texts and the practical implementation. At this last level, a detailed article is dedicated to the European ALARA Network.

The review can be downloaded from DGSNR Web Site: http://www.asn.gouv.fr/Publications/dossiers/c167/controle167.asp

10th European ALARA Network Workshop

"Experience and new developments in implementing ALARA in occupational, public and patient exposures"

Prague 12th- 15th September 2006

Introduction
Previous EAN workshops have focused on the optimisation principle in specific circumstances, for example for a specific work sector or particular types of exposure. The subjects have been chosen to reflect areas with potential for the further development and implementation of the concept of ALARA.

This is the 10-year anniversary of the EAN Workshops, and the aim is to consider the optimisation principle as a whole. This principle is fundamental to radiation protection, and the workshop aims to draw together key stakeholders to discuss its past, present and future status. In particular, the workshop will consider the practical implementation of ALARA, and how this might be improved in the next 10 years.

Objectives and Scope
The main objectives of the 10th EAN workshop are to:
- Review the past evolution of the ALARA concept, internationally, within the EU, and nationally, in terms of the practical impact on radiation protection;
- Examine the current status of the implementation of the ALARA principle; and
- Identify needs for future developments in the concept and implementation of optimisation.

As with previous Workshops, the workshop will consist of presentations (oral and posters) and work in small groups. Presentations will be invited on the following subjects:
- The history of ALARA in Europe;
- Future ICRP recommendations on optimisation;
- International (IAEA) actions on optimisation;
- Identifying needs for future developments in ALARA implementation; and
- ALARA implementation in different areas:
  - Occupational exposures in general (ESOREX)
  - Nuclear sector
  - Medical/patient exposures
  - Non-destructive testing
  - Exposures from NORM
  - Public exposures.

The working group sessions will consider the following issues:
- How to encourage the involvement of different stakeholders in implementing ALARA;
- How to further develop ALARA culture (including education and training);
- How to assess ALARA implementation (including performance indicators); and
- How ALARA interfaces with the justification principle, and with other types of risk management.

Target Audience

A mixture of different stakeholders is encouraged. Interested parties will include regulatory bodies in charge of radiation protection as well as other workplace risks; representatives from the medical, industrial, nuclear and NORM sectors; employers, employees and their representatives; environmental associations; training organisations; as well as international and national bodies concerned with radiation protection issues.

The number of participants will be restricted to a maximum of 100**.** The Workshop will take place **at Prague University in the Faculty of Nuclear Sciences and Physical Engineering, starting midday on Tuesday 12th September, and finishing midday on Friday 15th September, 2005.**

Fee and registration
The attendance fee will be **400 €** (documentation is included)**.**

You have to register on-line on the 10th Workshop Web Site: http://alara06.jaderne.

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