

**Summary and Recommendations of the 7th EAN Workshop on
"Decommissioning and Site Remediation"
Arnhem, The Netherlands, October 2003**

Some 60 participants from 11 European countries attended the 7th EAN Workshop on "Decommissioning and Site Remediation". This was the first time that a Workshop re-visited a specific topic: the 1st EAN Workshop (Saclay, France, 1997) was devoted to "ALARA and Decommissioning".

There were 20 oral presentations, mainly devoted to case studies of work undertaken in a variety of different situations (from accelerators and hot cells, to mineral wool (NORM) facilities and contaminated apartments). In addition to a scene setting session there were sessions on:

- Site remediation and prevention of internal exposure;
- Decommissioning of installations outside the nuclear fuel cycle;
- Effectiveness and feedback from the use of dose and dose rates estimating factors.

The opening session reviewed the progress made with the recommendations from the 1st Workshop, and identified a series of issues and questions for later consideration in the Working Group sessions. There were two such sessions where the participants were split into 6 Working Groups tasked with addressing specific issues. The reports from these groups were presented and discussed in the final two sessions in order to identify the key findings and recommendations.

Progress made since the 1st Workshop

The implementation of the eight recommendations made at the 1st workshop was reviewed in detail in a scene-setting presentation (Deboot). In addition to this, the themes raised were also a feature of many subsequent presentations. A summary of this is given in the table below.

| Recommendations from 1 st EAN Workshop | Follow-up EAN workshop/activity | Number of papers at the 7 th Workshop ¹ |
|---|---------------------------------|---|
| 1. External dose tools | | 5 |
| 2. Internal dose tools | Workshop 3 (1999) | 2 |
| 3. Total risk approach | Workshop 4 (2000) | |
| 4. Decision aiding (transparency) | | 1 |
| 5. ISOE | Research reactor sub-network | |
| 6. Non-nuclear sector | Workshop 2 (1998) | 3 |
| 7. Harmonised system of control | | 8 |
| 8. Clearance criteria/acceptability | | 2 |

¹ Represents the number of papers that addressed the particular subject. Some papers covered more than one subject, and many papers focused on new issues entirely.

Findings and recommendations

Although there were a range of subjects covered during both the presentations and the working groups, four general themes emerged from the workshop. These are discussed below.

1. Are we really implementing ALARA in decommissioning and remediation?

In many of the cases presented, it was clear that a diverse range of factors were involved in real decommissioning/remediation operations. The end-point, in many cases, was a decision to remove all detectable activity, irrespective of whether this constituted a significant residual risk. This raised questions about whether this approach is ALARA, or indeed whether the optimisation principle has a role. Specific conclusions reached during the workshop were:

- The costs associated with decommissioning and remediation are complex. Although these costs can be very high, they are not all associated with dose restriction. Decision-aiding techniques, such as cost-benefit analysis, have a very limited impact in practice, and should be applied with care;
- “Social issues” are often an overriding factor, especially where public exposures are involved. These issues include public opinion and media pressure, and the overall effect is to produce a situation referred to as “ALATA” (as low as technologically achievable), a phrase introduced at the Workshop;
- Although social factors and pressures are valid and important, the Workshop expressed concerns at the establishment of “zero risk” endpoints. These are never entirely possible, are often impractical, and encourage unrealistic expectations and the disproportionate use of resources.

In comparison, the ALARA principle does appear to be well-implemented in cases where occupational, rather than public exposure, is the issue: many of the presentations confirmed the key role that optimisation now plays in planning and undertaking such operations. One possible exception to this is internal exposures, which are, in some cases avoided at the overall expense of increased external doses.

Recommendation 1: Management of occupational internal exposure

In some cases, too much emphasis is placed on avoiding occupational internal radiation exposures, to the detriment of external radiation control. This approach is sometimes necessary, for example because the internal radiation hazard is unpredictable. In other cases, operators should aim to ensure an overall balance between internal and external radiation doses to workers.

Another clear factor to emerge is that both decommissioning and site remediation involve other (non-radiological) hazards, and an integrated or “holistic” approach to risk management is desirable. Adoption of this approach throughout the lifetime of operations would be especially beneficial to the final decommissioning/remediation operation.

Recommendation 2: Integrated risk approach

An integrated (or “holistic”) approach to risk management in decommissioning and site remediation should be encouraged by international bodies such as IAEA, ILO, NEA and EC. This should be supported by regulators and implemented by operators, and should aim to include:

- A simultaneous consideration of non-radiological hazards and risks, so as to provide the best overall protection of persons and the environment; and
- Greater emphasis on life-cycle planning of facilities, where the issues of decommissioning and remediation are considered throughout.

2. What is the role of the stakeholders in decision-making?

Examples were presented in which increased stakeholder involvement, especially from members of the public and their representatives, had been actively pursued. These involved more proactive ways of providing information (telephone “help-lines”, open days, etc), as well as encouraging participation in the actual decision-making process. The evidence suggests that this has helped raise wider public awareness and acceptance, which in turn has been beneficial to the overall operation. The workshop concluded that wider application of this approach should be encouraged.

Recommendation 3: Stakeholder involvement

Experiences presented in the workshop have shown the importance of involving all interested parties (stakeholders) in the decision making process dealing with site remediation. To encourage this, it is recommended that:

- EC and other international organisations provide guidance and spread feedback experiences;
- national authorities provide suitable regulatory frameworks; and
- decision makers make arrangements to invite views from different stakeholders, and set up forums in which each may make a relevant contribution. These arrangements should normally be the responsibility of operators, where they exist, in consultation with the relevant authorities.

3. Are there specificities in the non-nuclear sector?

It was very clear during the workshop that this sector can be defined in different ways, and covers a broad range of situations, for example:

- Low level contamination, e.g. in research laboratories;
- Very high contamination levels in source production facilities; and
- NORM sites with large volumes of waste.

Many differences with nuclear sites were noted, for example in terms of the historical use of sites, their location, etc. Overall, however, it was felt that appropriate decommissioning/remediation techniques exist but need to be adequately selected, in many

cases using lessons learned from the nuclear industry. At this stage, although there appears to be no need for new tools/techniques to be specially developed for this sector, the decommissioning industry is far from being mature. It was moreover suggested that an inventory of relevant sites to be decommissioned/remediated would help encourage the sharing of experience and good practice.

Recommendation 4: Inventory of non-nuclear sites

The workshop identified a need for national and international inventories of non-nuclear sites to be decommissioned and/or remediated. This should include past operations as well as sites still in operation. In the first instance, national authorities are encouraged to assemble such an inventory, and to make it available to interested parties to encourage the sharing of experience and feedback, and to ensure transparency.

For NORM-contaminated sites, it was noted that historical processes were often undertaken with no knowledge of the associated radiation hazard - this may still be the case with some existing processing plants. This can result in large-scale decommissioning/remediation problems for operators, many of which lack relevant knowledge of the radiological issues that need to be addressed.

Recommendation 5: Guidance for NORM sites

In the case of NORM-contaminated sites, there is often less awareness of radiological problems and hazards. Guidance should be developed by international bodies to help those responsible for such sites to:

- Identify likely sources of contamination;
- Assess the radiation hazards; and
- Select suitable techniques for decommissioning and site remediation.

4. Are there still further needs for external dose prediction tools?

The session devoted to these tools indicated that they continue to be developed and are increasingly sophisticated. One major development has been in the graphical interfaces used to display the results in 3D. These tools clearly have a role in ALARA planning, especially for work in high dose rate areas, and are also a useful training aid. With the increasing number of available tools, it was suggested that a means of benchmarking and comparing different systems was a priority. It was also noted that the Workshop had provided a useful forum for communications between different organisations using different tools, and that this should be encouraged further.

Recommendation 6: External Dose Prediction Tools network

The EAN (with the support of the EC) should establish a European “sub-network on dose prediction tools”, involving users, developers, and other stakeholders to share experiences, develop common standards and identify future needs for decommissioning and site remediation operations.

The workshop noted that the current sophistication of dose prediction tools needs to be matched by the training of users.

Recommendation 7: Training for users of dose prediction tools

Training for users of prediction codes and tools is necessary to help ensure that the results obtained are both consistent and reliable, and that they are interpreted correctly. IAEA have already developed training material on this topic. One of the functions of the recommended sub-network on dose prediction tools should be to review and comment on existing training material. These comments should be disseminated to users and suppliers of dose prediction tools, and also fed back to IAEA.

One of the working groups on dose prediction tools also considered the protocols for obtaining radiological data prior to site remediation, and concluded that this was an area of concern. IAEA have produced guidance on the radiological characterisation of sites prior to remediation operations. However, the Workshop noted evidence that site characterisation costs were becoming increasingly significant. This was often due to uncertainty about the amount of radiological monitoring and sampling required. The demands of different national regulatory systems were also noted.

Recommendation 8: Site characterisation tools

Further guidance from international bodies on site characterisation protocols (sampling requirements, etc.) is recommended at the beginning and end of the remediation/decommissioning process. This guidance should aim to provide a common framework for decision-making within the context of different national regulatory systems.

Conclusion

Many improvements have been achieved since the first Workshop on “ALARA and decommissioning”, both in practice (as shown during the exchanges on case studies) and in the methodological area (recommendations from national and international bodies on management strategies, methodology and tools for estimating doses to public and the workers...). The role of a network, such as EAN, to widely spread information to interested parties appears to be very efficient and will help in promoting further progress.