

**Summary and Recommendations of the 5th European ALARA Workshop on
“Industrial Radiography – Improvements in radiation protection”
Rome, Italy, October 2001**

Structure and Content

That Workshop included some 26 papers for oral presentation and 17 poster papers. For a major part of the Workshop the participants split into 6 Working Groups to review the issues associated with industrial radiography and recommend ways forward.

The opening paper from P. Shaw set the scene for the workshop by reviewing the scale of industrial radiography work and the frequency with which overexposures and accidents occurred in this sector of work. While the European Statistics from ESOREX (G.Frasch paper) provides a figure of about 20,000 workers in industrial radiography in Europe (EU member states and applicant countries), P. Shaw noted that other estimations rise up to 40 to 50,000 workers. He also noted that a number of different international organisations (UNSCEAR, WHO reference Centre "Institut Curie", IAEA...) had reported that about 40 % of occupational exposure radiation accidents involved industrial radiography. The paper identified a number of issues and questions for the Workshop to consider.

A paper from G. Nardoni (AIPnD, Italy), the president of the International Committee for Non-Destructive Testing reviewed relevant changes in technology and whether this presented new challenges to radiation protection or opportunities for a major shift to non-radiation techniques. He concluded that although there are certain sophisticated new developments that can improve the quality of the test results, at present these are limited in application, and that there was unlikely to be a significant change in the pattern of radiation based industrial radiography in the foreseeable future.

“Radiography has been the first non-destructive testing technique... The ultrasonic examination represents the major competitor to radiography... The radiography examination is the only one that can clearly detect a lack of penetration at the root of the welds... This capability of identifying the nature of defects, make radiography the mandatory test for the qualification of welding procedure and welder qualification... Another large application of Radiography is the examination of castings... No other test may be used in this case...”

A number of presentations from equipment manufacturers demonstrated that advances had been made in the safety aspects of the design of equipment. Several of these focussed on the introduction of Selenium-75 and the potential this provided for smaller Controlled Areas. However they also noted the reluctance of NDT companies, in a competitive market, to invest in equipment that provided greater safety features but cost more than the traditional equipment. A similar point was made by regulatory body representatives : “the main problem is that this is a very competitive field, where customers put high pressure on the gammagraphy facilities owners and they in turn on their workers” (E. Rodrigo Gonzalez).

A session on Safety Culture/Organisation and Management had a number of papers reviewing the various influences that contribute to:

- a) Poor working practices: for example, due to poor working environments. A. Garrigou noted that “industrial radiography is often presented by clients as an easy job...”, while ergonomic studies show that “According to the surroundings of the element to test (for example when there are scaffoldings, solenoid valves, etc... the installation of the film cassettes and of the guide tube can become a tricky job...” (see Picture 1)



Picture 1. Risky and uncomfortable posture during a radiography

- b) Improving working practices, in particular through the attitude of management, clients and Regulators. It was noted (A. McDonald) that clients that placed emphasis on safety matters and were known to inspect operations, got the better trained and equipped radiography teams. H. Hoogstrate provided the NDT firm's point of view in terms of both managers and workers; he pointed out several good practices. During the discussions, certain regulatory requirements appeared to be quite different from one country to another. For example, in some countries it is mandatory for the client to notify regulatory bodies in advance of any industrial radiography job to allow an inspection of the NDT organisation and working conditions as well as to facilitate the preparation of the work at the NDT company level.

The session on training reviewed a number of existing and new initiatives to improve training standards and some new initiatives in different countries. An example of the latter is an IAEA programme of work to develop training modules for industrial radiography, coupled with a programme to "train the Trainers" (J. Wheatley). An important input to this is the ability to capture and learn the lessons from accidents and a number of initiatives were covered in the papers: the UK Ionising Radiations Incident Database (IRID), the French "Retour d'Experience sur Les Incidents Radiologiques" (RELIR), the EC European Union Accident and Incident Data Exchange system (EURAIDE) and the IAEA Radiation Event database (RADEV).

Working Groups

The questions posed in the overview paper by Shaw et al. provided the starting point for the discussions of each of the Working Groups. Each Group was given a particular area to focus on but were not constrained from considering other issues. The final session of the Workshop was devoted to the reports from the Groups and general discussion. As might be expected there was considerable overlap between the reports due to the interdependency of many of the issues. From this there emerged a broad consensus of the "needs" in order to pursue the

ALARA objective in Industrial Radiography, together with recommendations on how these needs could be addressed.

Needs

Training

There is a case for harmonised standards of training for industrial radiographers and the supervisory staff within European countries. This should include periodic refresher training.

The first step should be to carry a survey of the present situation in Europe.

- To ensure high standards, mechanisms for Approval/Certification should be introduced, to cover - Radiographers - Supervisors - Trainers - Training Centres;
- Incident and Accident feedback should be part of the training;
- Training should include practical exercises, such as source recovery;
- Accidents & Feedback;
- Event/accident reporting needs to be encouraged to ensure that lessons are learnt This requires the establishment of reporting and feedback mechanism that protect the anonymity of persons and organisations;
- Where serious accidents occur, detailed investigations to identify the underlying causes should be encouraged;
- To facilitate feedback a unified categorisation system should be developed;
- The means of making the feedback available in the local language is important. (It was recognised that the work of the EU with EURAIDE and the IAEA with RADEV addressed this and the previous issue);
- In addition to learning from accidents there was a need to learn from good practices: the EAN Newsletter provides one means of doing this but there is scope for more.

Equipment

- Equipment manufacturers need to continue to liaise closely with users and regulators to ensure that designs are optimised to minimise failures (sources disconnects etc), doses and conventional non-radiological risks;
- There is a need for the development of an active detection system integral to gamma radiography source containers to positively confirm (in a fail-safe manner) when the source is not fully retracted. This will not be easy, but the potential benefits are worthy of committing research resources;
- Safety improvements in design come at a price and experience indicates that the highly commercial nature of the industry is such that many companies will not make the necessary investment unless there are commercial incentives from Clients as well as supporting regulatory pressures.

Influencing Safety Culture

- The doses received by workers in industrial radiography are often higher than in the nuclear industry and there is a need to encourage work planning and dose management;
- Regulatory bodies can set the tone for safety culture and therefore they must have appropriate enforcement powers and be seen to use them if required;
- Licensing of radiography companies should take into account training requirements, the financial provision made for them (and other aspects of safety) and the history of provision;
- Because of the competitive nature of the industry, Clients are seen as being potentially particularly influential on the standard of radiological safety delivered by industrial radiography companies. There is a need to raise the awareness of the clients and to also remind them of their responsibilities for safety when industrial radiography takes place on their premises.

Conclusions and Recommendations

As well as identifying the “needs” for improvement, the workshop also identified the principal means by which these could be addressed; either through giving ongoing support to existing initiatives or through new initiatives.

- 1) A Working Group should be established at the European level to take forward improvements. The core of this group should be representatives from European ALARA Network and the European Non Destructive Testing Society, with other Stakeholders being drawn in as the Working Group develops.
- 2) The Working Group would provide an appropriate vehicle for:
 - a. Developing Codes of Practice, targeted at Clients as well as NDT organisations, to provide guidance on safety requirements and best practice.
 - b. Carrying out a review of the current situation in Europe.
 - c. Developing a unified approach to training (with links to IAEA’s programme in this area).
- 3) The European Union should commission research into the development of an active detection system that could be integral to radiography source containers to positively confirm whether the source is, or is not, in the fully safe condition.
- 4) There was strong support for the EU draft High Activity Sealed Sources (HASS) Directive, as being a means to improve source security.
- 5) There was strong support for the development of national databases on radiation accidents and improvements to the feedback mechanisms being pursued by the EURAIDE (EU) and RADEV (IAEA) projects.