MANAGEMENT AND TRAINING ASPECTS OF THE EMERGENCY PLAN

J R A Lakey
John Lakey Associates, Meopham, Kent, DA13 0JA, UK

INTRODUCTION

The main objectives of an emergency management system are to prevent or reduce the likelihood of consequential loss in the event of an emergency occurring. In the event of a nuclear accident the effectiveness of measures for the protection of the public will depend on the advance preparation especially in education and training. This paper reviews two recent initiatives and concludes with comments on the future development of this subject.

There is an increasing requirement in legal and moral terms for industry to inform the population of health hazards to which they are exposed. In a report (1) published by the Nuclear Energy Agency (NEA/OECD) radiation protection was described as a subject which is impenetrable to the layman and as wide as it is complex. For this and other reasons radiation hazards are perceived to exceed all others and the public appear to have a poor image of the radiation protection specialists. Communication with the public and the media is widely recognised (2) as a key part of an emergency plan. This view is supported in the European Union which has sponsored the book on "Radiation and Radiation Protection - a Course for Primary and Secondary Schools" (3) which is described in this paper.

The training of emergency teams includes the use of drills and exercises (4) to maintain skills and can also be used to test the adequacy of plans. Every effort should be made to simulate the pressure on time and resources which would occur in a real event. Radiation emergencies are fortunately rare and so there is little practical experience of these events. The emergency worker must gain some radiation protection skills and must be able to use some technical language when communicating with specialist advisors. For this reason the European Union has sponsored the book "Radiation Protection for Emergency Workers" (5) which is also described in this paper.

A COURSE FOR PRIMARY AND SECONDARY SCHOOLS

In the European Union the Council Directive (6) on public information was adopted in 1989. This emphasised that the public should understand the issues involved and be prepared in advance of the emergency. The Commission organised a Seminar (7) in 1988 and the outcome was a suggestion that teaching material on radiation protection should be developed for use in Schools of Member States. The Directorate General XI (DG XI) (8) developed a first draft of the Teacher's Manual. A "spiral curriculum" was chosen because radioactivity, ionizing radiation and non-ionizing radiation are fairly complex and abstract subjects in particular for younger and less advanced pupils. This means that items recur in a gradually more complex form. The material was set out in five levels covering ages 6 - 16. In the first three levels emphasis is placed on relating the pupils personal and every day experiences and they are made aware of the risks and benefits of ionizing radiation. In the final two levels a more detailed examination is made of the subject from both a technical and social point of view. The original text was tested by the University of Utrecht and edited into a convenient loose leaf format. A test printing of the text was produced in 1993 and presented to a group of European Communities experts together with a formal presentation of the survey results. Reports were given by

teachers involved in the testing and the two original authors responded to the comments presented their views. The course was modified in response to recommendations made at this meeting. New Chernobyl information was added and potentially confusing material on the "green house effect" was deleted. The first edition in loose leaf format was published in 1994. This will not be the end the story; success will depend crucially on the sharing of the experience gained by teachers who choose to use this book.

RADIATION PROTECTION FOR EMERGENCY WORKERS

This CEC book (4) is intended to support emergency team training and introduces the principles of radiation protection and the properties of radioactive materials. Radiation doses, their consequences and principles of radiation detection are explained. Guidelines are given for protection against radiation from external sources and from internal sources. The annex to this paper gives an example of the guidelines used in the book. A number of radiation emergencies are described to provide a basis for the lessons learned. The booklet concludes with appendices on the atom, on nuclear fission and the regulations for transport of radioactive materials. A list of radionuclides and a list of SI prefixes precedes a glossary which covers the terms used in the book and related topics.

FUTURE ACTIONS

Education. Experience of exercises and incidents occurring in the nuclear energy programme reveals that there is sometimes a gap (9) between the desired response from the engineering team and the resources available. This is where professional skills and engineering judgement are demanded, and where precisely defined training schemes and rule driven response is likely to fail. This gap probably occurs in the reponse to many other emergency situations and may be a neglected area of the engineer's education. A new syllabus has been published for an undergraduate awareness course emphasising the engineer's responsibility for health and safety of the public (10). This duty of care to the towards the public should also apply to the engineer's rôle in the response to emergencies and so an extension to this syllabus is proposed.

Performance under stress. Experience in the conduct of exercises and in real emergencies suggests that emrgency response teams do improve their performance with practice and experience. Performance under stress demands a cool heads which probably can be acquired in training. Correlation between training performance standards and the real thing is difficult, more research is needed especially in the study and alleviation of stress.

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ANNEX - GUIDELINES ON PERSONAL DOSE REDUCTION *.

Emergency personnel must take precautions to protect themselves against all hazards at the site of an emergency. These guidelines are provided as an aid to the application of the ALARA principle in emergency response. Seven steps for your protection against radiation are summarised below:-

1. See the Source - make every effort to identify the type of radiation hazard. Search for the trefoil symbol, recognise the shape of standard sources and their containers, get expert advice, notify proper authorities.
2. Seek containment - do not move a damaged source, avoid breaking protective enclosures, close doors and windows. Cover all exposed skin. Do not eat, drink, smoke, rub eyes or apply skin preparations such as sun tan lotion and cosmetics.
3. Stop Spread - monitor and cover or decontaminate surfaces, do not spread activity by your own movements and set up a barrier or control line at a safe distance out of range of the source.
4. Shorten Exposure - keep exposure time as short as possible, reduce the time of working close to the source, move away into a clean or low dose rate area to think, to discuss. Rehearse all actions.
5. Step away - keep as far away as possible, never touch the source, use appliances such as long handled tongs, view the scene through a telescope, use a mirror to see round a corner. Position vehicles and command post up-wind, out of smoke and away from liquids.
6. Shadow Shield -install a radiation shield which is as thick and as heavy as possible, place it as close to the source as possible, work behind a shield, make use any available structure as a shield.
7. Self check - check your dosimeter frequently, check your own clothing for radioactive contamination at the barrier, look out for non-radiation hazards. Communicate with the controller.

* extract from reference 5