

## CHERNOBYL: A CONTRIBUTION TO OUR LEARNING PROCESS

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The Chernobyl accident and its widespread impact have prompted a process of critical review and revision of approaches to the management of accidents that has fully involved the international community. The OECD/NEA has participated to this effort by analysing the lessons learned from the accident and contributing guidance for a fresh approach to the protection of the public in the event of a nuclear accident.

### INTRODUCTION

One of the main driving forces to achieve progress in our society is learning from experience. This is true in improving radiation protection as it is in any other human undertaking. Although this is unfortunate, we must accept that accidents and malfunctions are one of the most powerful sources of experience and, in this respect, the Chernobyl accident, in 1986, has triggered, and still continues to stimulate, one of the most wide-ranging learning processes ever experienced in radiation protection, in areas such as accident consequence assessment and management, emergency preparedness, radioecology and the like. In effect, before Chernobyl the attitude of national authorities and radiation protection operators was one of relative self-confidence with respect to the validity and effectiveness of international guidance and of national preparedness for the protection of the public in the event of nuclear accidents.

The reality of a major accident as the Chernobyl one did, however, show that the degree of preparedness to manage the consequences of an accident of that size was not satisfactory. In fact, although the radiological impact in countries other than the Soviet Union was not large, the progressive spread of contamination at large distances caused considerable concern in Member countries. The reactions of national authorities were varied, ranging from a simple intensification of the normal environmental monitoring programmes up to compulsory restrictions on the marketing and consumption of food and other measures directly affecting the public. This apparent disharmony of protective actions and intervention levels caused concern and confusion among the public, perplexities among the experts and difficulties to national authorities, including loss of public credibility. All this resulted in a widespread perception that several lessons should be learned from this negative experience and a consensus that efforts should be directed towards a better international harmonization of the scientific bases and co-ordination of criteria and measures for the protection of the public in case of emergency.

These conclusions have triggered a vast effort of improvement of emergency planning arrangements in almost all Member countries, but also a renewed attempt by several international organisations to apply the Chernobyl lesson to the rationalisation of principles and criteria and the enhancement of harmonisation and co-ordination of their practical application to the management of nuclear accidents.

## THE ROLE OF THE NEA

The NEA, through its Committee on Radiation Protection and Public Health (CRPPH), has played an active role in this process assisting Member countries to identify the main lessons to be learned from the accident and promoting a number of co-operative actions to transform these lessons into improved accident management concepts and procedures.

The CRPPH felt that a first step for establishing where the Agency's effort should be applied was to make an independent assessment of the radiological impact of the Chernobyl accident and a critical review of the consequent emergency responses adopted by the different countries. The Agency, therefore, prepared a first report, published in 1987 (1), which analysed in some detail the radiological impact in all the OECD countries and the protection measures adopted by those countries. This analysis, of course, had a preliminary character in view of the provisional data available at the time, but it still remains today the only assessment established on the basis of information provided by the Member countries and officially endorsed by the national authorities concerned. The NEA also carried out, at that time, a detailed survey of the organisational and technical aspects of the emergency preparedness existing in the Member countries at the time of the Chernobyl accident, as well as of the changes introduced or planned as a consequence of that accident (2). These analyses allowed to identify the principal concerns of the authorities and the public opinion in the different countries.

The first conclusion that could be drawn from these analyses was of a conceptual nature. It was realised that the impact of a major nuclear accident would inevitably have an international dimension and it would require, therefore, a closer harmonization of the intervention criteria beyond the mere harmony of the general principles, which was already existing, as well as an extension of the space and time horizons on which to base the emergency plans, by adding to it elements of greater flexibility and a capability to manage contaminations affecting large territories, and with consequences extending over long time spans. Another important conclusion of the CRPPH analyses was the need to improve the technical systems used for the assessment of the radiological impact of an accident, such as monitoring methods and network systems for rapid alarm and real time assessments, calculation models and analysis methods. Finally, the failures of the systems of communication and information have been one of the major objects of blame during and after the Chernobyl accident. This lesson was not missed and it resulted in a considerable attention being focused on the need to improve the quality and the effectiveness of the communication of information in case of emergency among competent authorities and towards the public.

A significant part of the problems identified by the CRPPH were clearly the responsibility of the national authorities. However, the Committee was able to identify a few areas where the Agency could provide a contribution compatible with its vocation and its limited resources.

### The intervention criteria

The first priority was attributed to the question of criteria and levels for intervention. The existing international recommendations, although their general principles were valid, had demonstrated their limitations during the practical management of the Chernobyl accident

consequences at large distances and in the long term. Thus, starting from a critical analysis of the existing recommendations, a group of experts of the Agency examined all the aspects of the intervention issue and developed a number of novel ideas on the determination of criteria and levels for intervention and their practical implementation (3, 4). In particular, the NEA group proposed a reasonably detailed approach for the application of the principles of justification and optimisation of interventions in the definition of the intervention levels and introduced the concepts of "upper boundary" and "lower boundary" of individual dose in the process of optimisation.

A particularly interesting concept is that of upper boundary, defined as the total individual dose, resulting from the whole of exposure pathways, beyond which the possibility of deterministic effects and the probability of stochastic effects are considered unacceptable. Beyond the upper boundary the intervention would thus become mandatory irrespective of the indications provided by the results of the justification and optimisation procedures. The validity of this idea was confirmed by a widespread demand for a criterion of this kind which had been expressed on several occasions in the international debate. The concept of lower boundary, a very small individual dose below which protective actions are unlikely to be justified even if the costs of the intervention are also very small, was also considered very useful and necessary by many experts. However, this concept does not appear to have been well received in the recommendations of other international organisations. Another original contribution introduced by the NEA was the consideration, which was absent in the previous international guidance, of the impact of certain special exposure pathways affecting specific groups, such as workers not involved in emergency operations, and the definition of specific protection criteria for these groups.

### The technical issues

In the field of the technical aspects of emergency planning, the NEA has chosen to limit itself to the study of a few issues which had not attracted the attention of other international organisations. First of all, an analysis was made of the possible differences in the radiological consequences of an accident if this were to happen in different seasonal and climatic conditions and how these factors could affect the application of emergency plans (5,6).

The Chernobyl experience was also the indirect source of another initiative recently taken by the NEA in the field of emergency exercises, which, surprisingly, had never enjoyed before a particular attention at the international level. A work programme is currently under way for an exchange of information and experience on national practices, the study of criteria and technical methods for the execution of emergency exercises and, as a final step, the organisation of international exercises under the NEA's aegis. Multinational or international emergency exercises are, in fact, seen as being of particular value to test the compatibility and co-ordination of neighboring countries' approaches to emergency planning by the simulation of scenarios which extend beyond national borders and to contribute to better mutual understanding and, possibly, closer harmonization of the basic approaches to emergency response on a truly international basis.

## The communication with the public

Last but not least, it was understood with the Chernobyl accident that the communication between countries and with the public is a fundamental component of a correct management of a nuclear accident, especially if it has an international impact. The information of the public is not the main vocation of the NEA, which is primarily a technical agency. However, it was decided to bring some contribution to those who are responsible for the information of the public and several initiatives were taken by the Agency in this field.

One interesting idea that began to be aired in 1987 was that of creating an international system for the classification of incidents and accidents according to their degree of severity, and impact to safety, to be used to facilitate the information of the public. At the end of 1987, a group of experts of the NEA had already set up a series of criteria for the development of what would have been called since the international severity scale for nuclear accidents and incidents. Subsequently, in 1989, the NEA and the IAEA decided to join their forces in this international undertaking and launched jointly, in 1990, the International Nuclear Event Scale (INES), which was adopted by a large number of member countries for a trial period before its final establishment on a permanent basis. A success of this endeavour would mean a significant step towards a better coherence and clarity in the communication with the public.

## CONCLUSION

In conclusion, the Chernobyl accident has revealed a number of weaknesses in the protection system such as it was conceived before the accident, but it has also indicated new perspectives for improvement. In this context, in which the international co-operation has played a major role, the NEA has tried to draw a maximum of lessons which could be useful to its Member countries and to provide, within the limits of its modest resources, an active contribution to the international co-operation and the improvement of radiation protection.

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