



SUMMARY OF THE IAEA ARLINGTON SYMPOSIUM ON THE RESTORATION OF ENVIRONMENTS WITH RADIOACTIVE RESIDUES

G. LINSLEY

International Atomic Energy Agency,
Vienna

Abstract

This paper summarizes the contents, results and conclusions of a Symposium organized by the International Atomic Energy Agency (IAEA) on "Restoration of Environments with Radioactive Residues", held in Arlington, Virginia, USA from 29 November to 3 December 1999. The present Conference may be seen as a follow-up to the Arlington Symposium but with the emphasis shifted from the experience of, predominantly, the USA to that of eastern Europe and the Russian Federation.

1. INTRODUCTION

In recent years the problem of radioactively contaminated environments has been increasingly recognized as important and in need of attention. The end of the "Cold War" refocused the policies of governments and brought about increased efforts worldwide towards the restoration of such environments. The new focus on environmental restoration has brought with it the recognition that there are no internationally accepted radiological standards for guiding environmental restoration. Nations have proceeded with restoration activities using 'ad hoc' criteria often based on radiological criteria intended for different purposes. Meanwhile, the relevant international organizations have been developing guidance appropriate to the restoration of contaminated environments. IAEA issued provisional guidance in 1997 [1] and ICRP published a report in 1999 [2].

With this background and in the knowledge that there is a considerable divergence of approach to the subject of decision making on environmental restoration between countries, the IAEA decided that it was an opportune time to organize an international symposium on "Restoration of Environments with Radioactive Residues". The Symposium was hosted by the US Government in Arlington, Virginia from 29 November to 3 December 1999 and was held in cooperation with the Department of Environment (USDOE), the Environmental Protection Agency (USEPA) and the Nuclear Regulatory Commission (NRC).

The Symposium had as one of its objectives the promotion of information and experience exchange in this subject area, but in addition the intention of the organizers was to focus the Symposium on the principles and criteria for guiding clean-up decisions rather than on the technologies being developed and used for restoration of affected areas.

The present Conference may be seen, from the IAEA's perspective, as a follow-up or continuation of the Arlington Symposium but with the emphasis shifted from the USA towards exploring the experience of eastern Europe and the Russian Federation.

2. STRUCTURE OF THE SYMPOSIUM

The IAEA, with the help of an Advisory Committee, designed the Arlington Symposium to promote the discussion of important issues and, where possible, the drawing of conclusions.

For this purpose a significant amount of time was allowed in the sessions for discussion and debate. The oral presentations were selected by the Committee to give a view of all important situations involving restoration and at the same time to give a global view of the subject. By this means it was intended that a) all the main types of contamination situation and b) all important radiological issues, would be addressed. These objectives were achieved by the presentation of a number of case studies intended to examine different types of restoration situation. The presenters were asked to address, in each case, the assessment approach, the radiological criteria used for decision making and its rationale and finally the resulting situation. Towards the end of the Symposium an analysis of the case studies was presented with the intention of looking for differences and similarities of approach and of drawing conclusions.

Prior to this, the Symposium had started with two sessions giving a) an overview of the world situation with respect to environmental radioactive contamination and b) international and national radiological principles and criteria for guiding restoration.

3. OVERVIEW OF THE CONTENT OF THE SYMPOSIUM

Session 1. Global Overview of Affected Areas

World (UNSCEAR review), USA, Russia, Europe, China, Iran.

Session 2. Restoration Principles and Criteria

ICRP, Germany, USA, Russia, France.

Session 3. Case Studies:

Nuclear test sites - Pacific Islands (USA), Maralinga (Australia)

Legacy of Discharges - France

Accidents – Goiania (Brazil), Satellite reentry (Canada), Chernobyl (Belarus, Russian Federation), South Urals (Russian Federation).

Mining and Milling - Australia, Canada, South Africa, USA, Germany

Residues from Practice Termination – NPP decommissioning (USA), Radium production (Belgium), Waste disposal (USA)

Session 4. Critical Analysis of the Case Studies

Session 5. Role of Public Participation

Session 6. Closing Session

4. HIGHLIGHTS OF THE SYMPOSIUM

Basic principles (Session 2)

The presentation of the new ICRP guidance on Protection of the Public in Situations of Prolonged Exposure by its Chairman, Professor Roger Clarke was an obvious highlight in the

Symposium. (now issued as ICRP Publication 82 [2]). This report extends the recommendations of ICRP publication 60 by applying the concept of intervention to aid decision making in the restoration of areas affected by residues from non-practice situations. The essence of the restoration guidance is “do more good than harm” and the document explains approaches towards achieving this end. It applies the well established principles of justification (of the restoration action), and once justified, the optimization of the radiation protection associated with the action.

It recognizes that the use of the public dose limit could lead to disproportionate expenditure of resources if used in the context of restoration of areas. Instead it recommends that restoration decisions should be guided by the results of site specific optimization and advocates the use of “averted dose” as a tool for determining the optimum action and action level. However, it also propose some generic action levels; these are the total annual dose above which intervention action should almost always be taken (100 mSv/year) and below which intervention action would not normally be justified (10 mSv/year) (“total dose” here means the dose due to exposure to the residual radioactivity plus that due to the natural radiation background).

Subsequent presentations on national principles and criteria and on case studies showed that, at the present time, approaches being adopted and applied nationally for all types of contamination situation follow the principles generally used for practice situations, that is, optimization of protection within the bound of a constraint upon individual annual dose.

The discussions surrounding this fundamental difference in policy pervaded the entire Symposium.

Case Studies (Session 3)

Nuclear testing sites

In this session an interesting discussion and debate started over the question of whether the restoration of residues from nuclear weapons testing should be regarded as a practice or as an intervention situation. Nuclear weapons testing was certainly a planned operation, but there were some mistakes and accidents resulting in more widespread contamination than originally planned. It was recognized that the restoration of all nuclear weapons test sites to within public dose limits would involve massive costs and therefore that access restriction may be the only practical solution for the most contaminated areas. This then raises the question, often debated in the context of radioactive waste disposal, of the acceptability of leaving burdens of cost and responsibility for future generations.

Accidents

The presentations and discussions on accidents, their consequences and the related environmental restoration revealed the important role of the public in decisions on environmental restoration. The public in affected areas is rarely satisfied by anything less than a return to the pre-accident condition. This target may be achievable for very small scale accidents or spills but is not feasible for larger scale accidents such as Chernobyl. However, even in these circumstances, the public is not prepared to accept standards, which would not be acceptable to people living in unaffected “normal” areas. This position has conditioned many of the post-accident restoration policies and the public dose limit of 1 mSv/year is the most used “standard” in these situations.

Termination of practices involving residues

For situations identified unambiguously as “practices” there seems to be good agreement on the policy for guiding restoration. The case studies and discussion showed that optimization (of some type) constrained by a dose constraint, dose limit or risk limit was a widely used approach for setting restoration targets. The value of the latter is usually 1 mSv/year or some fraction of it or its risk equivalent.

5. CRITICAL ANALYSIS OF THE CASE STUDIES

The following is the author’s selection of points raised by the critical analysis presentations and discussion. (Session 4)

Practices versus interventions

It was evident from the case studies and discussions that there are problems in reaching agreement on whether a given situation is a practice or an intervention. The example of the nuclear weapons test sites was mentioned earlier, another example is that of historic abandoned practices—a practice or an intervention? According to the guidance of ICRP, the difference in the applicable criteria would be considerable! In discussion, the point was made that problems of public acceptance can be expected if experts disagree on such important interpretations.

The analysis (by experts familiar with ICRP concepts) indicates that many of the situations identified as practices in the case studies should have been treated as interventions. In fact, only a few of the case study situations were treated as interventions and they were: Maralinga-nuclear test site (Australia), Wismut-historic mining residues (Germany), and Olen-historic radium processing site (Belgium).

Averted dose versus residual dose

The use of averted dose in optimization studies can be effective in helping to find the optimum radiation protection solution. However, the approach is difficult to explain to non-experts. Further, people affected by restoration decisions are more concerned by the dose rate which will remain after restoration—the residual dose. Radiation protection arguments in the context of environmental restoration may, therefore, be more successful if they are presented in terms of residual dose.

Public dose limit

The public dose limit is often used as the dose “target” for restoration operations. This is usually because of the acceptability to the public of well established national and international standards—even when they were originally established for different purposes. The public resists accepting standards, even with a good rationale, which are higher (more relaxed) than those being used in areas not affected by radioactive contamination.

Decision aiding versus decision making

An important point, emphasized in the discussions at Arlington, is that radiation protection guidance is only one of the factors which have to be considered by decision makers. Other factors include public opinion, legal constraints, political considerations and economics.

However, it is important to distinguish between decision aiding and decision making. It is the role of the radiation protection expert to give the best professional advice, even if it is subsequently ignored by the decision maker because of political or public opinion considerations. The radiation protection expert should not anticipate the opinion of the public in giving his view, for example, by accepting the public dose limit as a restoration target, rather, these considerations should be left to the decision maker. The discussion at the Arlington Symposium indicated that a possible confusion of roles might exist in this context.

6. FINAL REMARKS

The Symposium was successful in its aim of promoting information exchange between experts from different countries and with varied environmental restoration experience. The discussions were extensive and broad in scope; they raised many interesting and sometimes controversial issues.

The Symposium showed that there is a significant discrepancy between the restoration policy advocated by the international organizations and the policies currently being adopted nationally.

It remains to be seen whether or not the new radiation protection guidance of the international agencies will find acceptance in countries faced with difficult decisions related to the restoration of areas affected by radioactive residues.

REFERENCES

- [1] INTERNATIONAL ATOMIC ENERGY AGENCY, Application of Radiation Protection Principles to the Cleanup of Contaminated Areas, IAEA-TECDOC-987, Vienna (1997).
- [2] INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION, Protection of the Public in Situations of Prolonged Radiation Exposure, Publication 82, Annals of the ICRP, Vol. 29, Nos. 1-2, (1999).