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NUCLEAR ENERGY AGENCY



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# DISPOSAL OF RADIOACTIVE WASTE

AN OVERVIEW OF  
THE PRINCIPLES INVOLVED



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## TABLE OF CONTENTS



1. INTRODUCTION
2. RADIOACTIVE WASTE IN PERSPECTIVE
3. THE GOALS OF WASTE DISPOSAL
  - 3.1. Protection of Health
  - 3.2. Protection of the Environment
  - 3.3. Responsibility to Future Generations
4. THE DISPOSAL OPTIONS
  - 4.1. Dispersal and Containment
  - 4.2. Passive Systems and Perpetual Care
  - 4.3. Retrievability
5. PUTTING PRINCIPLES INTO PRACTICE
  - 5.1. Release of Effluents
  - 5.2. The Disposal of Solid Waste in the Terrestrial Environment
  - 5.3. The Disposal of Solid Waste in the Marine Environment
6. DETERMINING ACCEPTABILITY
  - 6.1. Attitudes to Risk
  - 6.2. Calculation of Exposures
  - 6.3. Assessment of Performance
  - 6.4. Introducing Probability



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## 3. THE GOALS OF WASTE DISPOSAL

The objective of waste disposal is to ensure that wastes are dealt with in a manner which protects human health and the environment, and minimizes any burdens placed on future generations while, at the same time, taking into account social and economic factors.

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## 3.3. Responsibility to Future Generations

A feature of discussions on the disposal of radioactive waste is the emphasis placed on considering the welfare of future generations. The principles that influence the attitudes of people in this matter include the general premises that it is wrong to knowingly commit preventable harm and that it is wrong to fail to take action which could prevent harm from occurring. And both of these apply even when it is impossible to identify in advance the people who may be affected. Yet another principle is that those who benefit from an activity should also bear the cost—a principle that sometimes takes the form “the polluter pays”. Principles such as these are obviously never fulfilled in an absolute manner. However, each has an influence which affects the final position taken by society. As always the balance between them is arrived at through a consideration of the detriments and the gains.



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## 3.3. Responsibility to Future Generations

It can be argued that, through the use of nuclear power and through the various applications of radioactivity, many benefits are being passed on to future generations. But in the particular case of radioactive waste disposal it may be harder to quantify the benefits than it is to imagine risks. Certainly, more time seems to be spent looking at the risks than the benefits and this may be one of the reasons for the strong tendency to accept the idea that the present generation should pay to minimize, for future generations, the problems that may be associated with waste disposal.



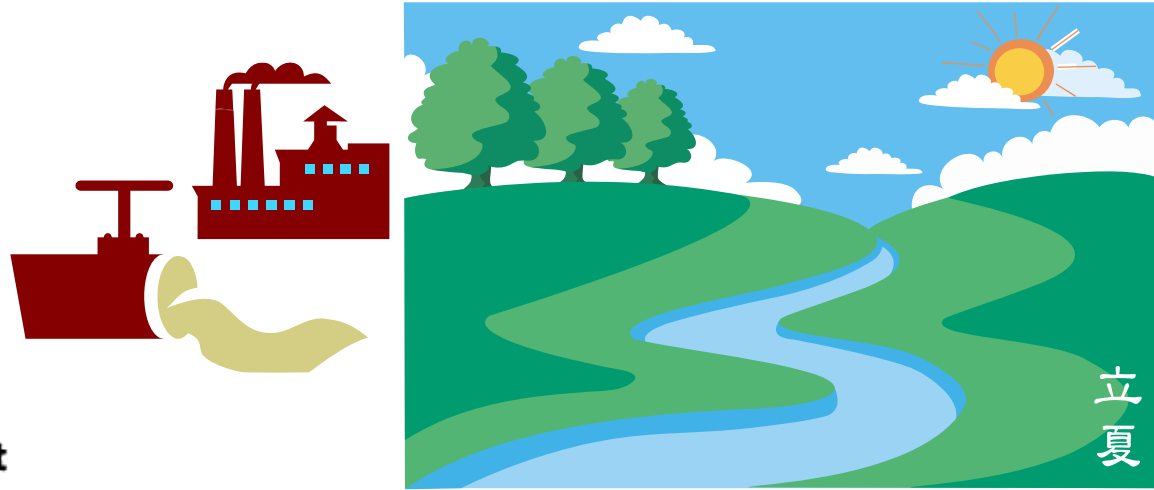
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## 3.3. Responsibility to Future Generations

There have been suggestions that a time limit could be set or that some other means should be found for reducing the emphasis placed on future risks. This may be a necessary, pragmatic approach since the acceptance of unlimited responsibility for all effects, no matter how small, could lead to an untenable economic commitment. The feeling of responsibility has become a strong factor in the search for technical solutions but what also has to be taken into account are the nature of the effects and the available resources. In the process of achieving a proper balance, the real question becomes "what is an acceptable level of risk to leave?". Since it is never possible to ensure absolute safety at any time, it is generally accepted that this society should attempt to leave conditions for future generations no worse than it would accept for itself.



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## 4.1. Dispersal and Containment

The first choice is between the two extremes of dispersal and containment. Dispersal is the deliberate release of waste into the environment and its dilution by air or water to a level sufficiently low to avoid unacceptable risks to individuals or to populations. Dispersal is a procedure which lends itself to careful control. Therefore, its use is rarely limited by concern for individual exposures but is influenced more by the consideration of cumulative exposure to the population in general. For all practical purposes, dispersal is an irreversible action and is considered suitable only for limited amounts of radioactive waste.

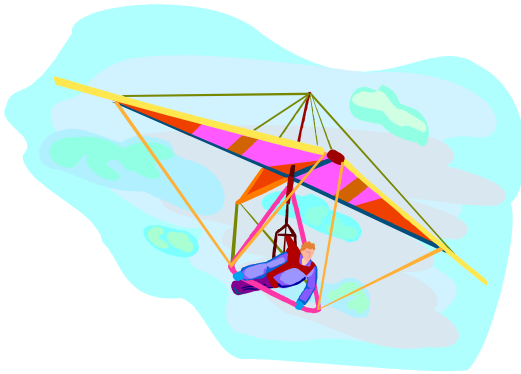
Containment consists of placing barriers around the wastes in order to restrict the release of radionuclides into the environment. The barriers can be either natural or artificial and a containment system can consist of one or more barriers. A system of multiple barriers gives greater assurance of containment and helps ensure that any release of radioactive material to the environment will occur at an acceptably low rate.



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## 4.2. Passive Systems and Perpetual Care

Another choice in the disposal of radioactive waste is between methods which, in the long term, place no reliance on human involvement and those which require the continued back-up of administrative controls.



In view of the fact that it is passive methods which dominate the present search for methods of radioactive waste disposal, it appears that institutional controls will be used as an essential component of disposal methods only to the extent that their continued existence and effectiveness can be relied upon. There are also indications that, in certain cases, institutional controls will be used with passive methods to provide a degree of assurance over and above that which has already been judged acceptable. In such cases, however, the use of the controls should not be regarded as placing a burden on future generations, because the presence of the controls was not a necessary factor in establishing the safety of the facility.



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## 4.3. Retrievability

The definition of disposal highlights the lack of intention to retrieve the waste. Therefore, in the case of a containment facility, retrievability is not a prerequisite for the post-closure phase. This does not mean that a system of recovery should not be provided during the period when a disposal facility is still open—either being loaded or waiting for the decision to close. Nor does it necessarily mean that wastes which have been disposed of would be impossible to recover. Lack of intention to retrieve does not necessarily imply irretrievability. Even with contemporary technology almost any undispersed materials could be recovered, although the difficulty and the cost of the operation would obviously depend on the type of waste and on the disposal location.

If, for some non-technical reason, it is decided that a disposal facility should include features to make it easier to retrieve the wastes then care must be taken not to compromise the integrity of the containment system. The safety assessment of the disposal facility should clearly indicate that the presence of features facilitating retrieval will not unacceptably increase the likelihood of radionuclide release.



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## 6. DETERMINING ACCEPTABILITY

The acceptability of methods for the disposal of wastes will be based on assessments of exposures to people that might occur and the cost that would be required to reduce them. But the overall process for determining what is acceptable involves input from the public. It is important for those who do the assessments to appreciate the context in which their calculations may be viewed.

