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TO THE COUNCIL, THE EUROPEAN PARLIAMENT AND THE ECONOMIC AND SOCIAL COMMITTEE

A COMMUNITY STRATEGY FOR RADIOACTIVE WASTE MANAGEMENT

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## A. INTRODUCTION

- I. The present situation of radioactive waste management in the Community
- II. A radioactive waste management strategy for the Community

## B. ELEMENTS OF A STRATEGY

- III. Harmonization of radioactive waste definitions and classifications
  - III.1. **Definition of radioactive waste**
  - III.2. **Classification of types of radioactive waste**
  - III.3. **Radioactive waste containing toxic elements of non nuclear origin**
- IV. Minimization of radioactive waste
  - IV.1. **Prevention of arisings and volume minimization**
  - IV.2. **Recycling and reuse**
- V. Transport: authorization and control
- VI. Optimization of the safety of radioactive waste management at Community level
  - VI.1. **Requirements for the safe disposal of long-lived and high-level waste**
  - VI.2. **Applicability of the proximity principle to radioactive waste management**
  - VI.3. **The radioactive waste equivalence concept**
  - VI.4. **Self-sufficiency in radioactive waste disposal and Community solidarity**
- VII. Public information
- VIII. Radioactive waste management financing and structures

## C. CONCLUSION

## A. INTRODUCTION

### I. The present situation of radioactive waste management in the Community

Radioactive wastes result from a variety of human activities, including nuclear electricity generation, agriculture, medicine, industry and research. Their management and disposal have been under continuous development in the Member States of the European Community for some decades. The state of radioactive waste management in the Community and the quantities involved are well known; since 1984 they have been the subject of periodical reports<sup>(1)</sup> by the Commission to the Council of Ministers and the European Parliament within the framework of the Community Plans of Action in the field of radioactive waste<sup>(2)</sup>. Presently, about 160,000 tonnes of radioactive waste are produced annually within the Community overall, where the estimated production of industrial toxic waste amounts to about 20 million tonnes. Over 90 % of the radioactive wastes are short lived, low or medium level, for which a number of treatment and disposal options and industrial facilities are available. However, the disposal of high-level and long-lived waste has not taken place yet, even if there is a worldwide consensus, based on the extensive research and development programmes being carried out in several countries, that their disposal deep underground in conditioned form is feasible and safe.

All activities involving radioactivity have been subject for several decades, and increasingly, to extensive and specific systems of authorization and control at international, Community, and national levels. This applies to radioactive wastes which have to be managed and disposed of in ways that ensure the protection of people and the environment, now and in the future, against the dangers arising from the ionizing radiations which they emit. Chapter III of title two of the Euratom Treaty and the basic safety standards Directive<sup>(3)</sup> lay down principles of radiation protection whose implementation at national level ensures that radioactive waste management practices in the Member States share a number of common features. However, differences exist in national policies and strategies for carrying out the practical management of the waste and ensuring technological safety.

### II. A radioactive waste management strategy for the Community

The purpose of this communication is to set out the elements of a radioactive waste management strategy for the Community; it responds, in particular, to the wish expressed by the European Parliament in its resolution of July 1991<sup>(4)</sup>.

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- (1) Communications from the Commission to the Council: COM(83)262 of 16.5.83, COM(87)312 of 29.7.87 and COM(93)88 of 1.4.93
  - (2) Council Resolutions of 18 February 1980 (O.J. C51 of 29.2.80) and of 15 June 1992 (O.J. C158 of 25.6.92)
  - (3) Basic safety standards for the health protection of the general public and workers against the dangers of ionizing radiation: Directive 80/836/Euratom (O.J. L246 of 17.9.80) and proposal COM(93)349 of 20.7.93 (O.J. C245 of 9.9.93)
  - (4) Resolution B3-1136/91, adopted 11 July 1991

The preparation of a strategy was announced in the Fifth Action Programme on the Environment, approved by the Council of Ministers on 1 February 1993. It is also in accordance with the objectives of the 2nd Community Plan of Action in the field of radioactive waste and takes into account the conclusions on radioactive waste disposal adopted by the Council in December 1990<sup>(5)</sup>.

A Community strategy for the management of non-radioactive waste was agreed upon by the Council of Ministers in 1990<sup>(6)</sup>. A separate strategy for radioactive waste management is desirable because, on one hand, radioactive wastes are subject to a separate system of legal measures based on the Euratom Treaty, and on the other hand, raise some specific aspects which require a rather different approach.

The proposed Community strategy is basically oriented towards safety and environmental protection concerns, envisaging an approach towards harmonization at Community level, where practicable, of the radioactive waste management principles to ensure an equivalent level of safety throughout the Community. It takes also into account the complexity of the radioactive waste issues and their relations with other policies and activities, notably of an industrial and economic character.

The proposed strategy represents a comprehensive medium and long-term programme, calling for a step by step approach for its future implementation. It takes into account all sectors involved: not only the energy sector, which concerns several Member States, but also industrial activities generating waste containing enhanced quantities of natural radionuclides, and the uses of radioisotopes in agriculture, medicine, research and industry, which concern all Member States. It takes into account the results of nearly two decades of specific Community and national R&D programmes; it is based on an analysis of the present situation and perspectives, in particular the completion of the Single Market.

In this context, the proposed strategy concentrates on the main elements which could benefit from a common approach at Community level, that is:

- The definitions and classifications of radioactive waste
- The minimization of radioactive waste
- The transport of radioactive waste
- The treatment and disposal of radioactive waste
- Public information
- The financing of radioactive waste management.

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(5) 1464th Council meeting - Communiqué 10871/90 (press 232)  
(6) Council Resolution of 7 May 1990 (O.J. C122 of 18.5.90)

## B. ELEMENTS OF A STRATEGY

### III. Harmonization of radioactive waste definitions and classifications

#### III.1. Definition of radioactive waste

The first step towards a common strategy must be a common definition of the issue. Since radioactivity is omnipresent in nature, the basic problem is to define which wastes may be of concern from a radiological point of view. On three recent occasions<sup>(7)</sup>, the Community utilized a definition of radioactive waste, consistent with that developed within the IAEA, on the following lines:

"Any material that contains or is contaminated with radionuclides at concentrations or radioactivity levels greater than the prescribed limits and for which no use is foreseen."

The limits prescribed were the reporting levels laid down in Article 3 of the basic safety standards Directive, which define possible exemptions from the reporting and authorization requirements of the Directive. The Commission has proposed new values in the current revision of the Directive<sup>(3)</sup> on the basis of appropriate scenarios for several categories of activities. The values are nuclide-specific and generally lower than the existing ones. These values apply to the small-scale use and subsequent disposal of radioactive substances. Exemption from reporting could also apply to the receipt of waste at concentrations of activity per unit mass below the exemption values, provided that the total amount of waste is relatively low.

The release of waste arising from a practice that is subject to the requirement of reporting, either for disposal or recycling, is in fact always subject to prior authorization. For very low-level waste the authorization can be granted on the basis of so-called clearance levels. A working party of the Article 31 group of experts is defining such levels for the recycling of scrap metals (see Section IV.2)

#### Action

To explore the possibility of establishing harmonised clearance levels for radioactive waste. These levels should be coherent with the reporting levels proposed in the revised basic safety standards.

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(7) In the Lomé IV Convention, in Directive 92/3/Euratom (reading Article 2 with Article 1.1), and in Council Decision of 25 July 1991 on the association of overseas countries and territories with the EC, O.J. L263 of 19.9.91 (annex VI)

### **III.2 Classification of types of radioactive waste**

Radioactive waste comprises a great variety of materials, with different physical, chemical and radioactive characteristics. The diversity results in widely differing potential hazards:

International bodies, national authorities and waste operators have therefore established radioactive waste classifications in their sector of competence or responsibility (waste treatment, transport, waste disposal, communication within the international scientific community and with the public, etc.), grouping in the same class wastes with similar characteristics and hazards, with a view to improving management and safety.

Most national needs of the Member States are adequately covered by the national classifications they have developed. Community action should be therefore oriented to questions which may lead to disparities in safety levels between the various countries.

In particular agreement should be reached at Community level about the categories of radioactive waste which are not acceptable from a long-term safety point of view for surface/near surface disposal; accordingly criteria for long-lived radionuclide content in the waste packages intended for surface disposal should be agreed upon at Community level.

Differences in radioactive waste classifications may also make difficult industrial cooperation between Member States within the framework of the Single Market; however, the general use by all countries of the international IAEA classification of radioactive packages for transport purposes provides an answer in the field of transportation.

#### Action

Development of criteria for establishing categories of waste, based on their disposal routes.

### **III.3 Radioactive waste containing toxic elements of non nuclear origin**

In special cases radioactive products are not the unique source of the hazards arising from a particular waste, non-radioactive toxic products may also be present; examples may be found in the radiochemical industry.

### Action

Review EC legislation applicable to radioactive and other wastes<sup>(8)</sup> in order to ensure that any added hazard arising from the presence of non-radioactive toxic waste is appreciated and allowed for in radioactive waste management.

## IV. Minimization of radioactive waste

### IV.1 **Prevention of arisings and volume minimization**

The radiation protection principle of justification already ensures that there is no unnecessary use of radioactive substances.

Scientific perspectives to reduce the radioactivity generated during the fission process in reactors or by activation of materials exposed to radiation are few and relevant to long-term research, notably Community research on the transmutation of long-lived radionuclides. In view of these facts the policy of minimization has to be focussed on the volume of waste generated.

The concept of volume minimization should form part of the safety culture and environmental concern in the field and should be therefore implemented with full respect for the optimization of radiation protection. Minimization covers a wide range of activities concerning the design, construction, operation and decommissioning of nuclear facilities, which should be encouraged:

- choice of materials for components, improvement in operating practices (limitation of secondary waste arisings, adequate sorting of the waste, etc.)
- improvement in decontamination processes, notably opening the route to the possible recycling of the decontaminated material
- improvement in treatment processes for direct volume reduction (supercompaction, incineration of combustible waste, etc.)

Economic incentives for minimization are mainly the cost of disposal, which should be borne fully by the waste producers; economic instruments towards minimization should therefore be looked at, notably in the fields of R&D and of new investments in advanced facilities.

In addition, the encouragement of voluntary cooperation between Member States on the practicalities of waste minimization should be pursued within the framework of the 2nd Community Plan of Action in the Field of Radioactive Waste (1993-2000).

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(8) - Notably Council Directive 91/689/EEC of 12.12.91 on hazardous waste

Finally, a waste minimization awareness culture should be developed in all nuclear plants and in all installations using radioisotopes, such as research or medical analysis laboratories, hospitals and factories.

#### Action

Conduct studies and research programmes at national and Community levels, in particular on partitioning and transmutation of long-lived radionuclides

Encourage minimization by means of arrangements between waste producers and waste operators and by means of economic instruments

Initiate a campaign to encourage cooperation between Member States in order to develop the setting up of a waste minimization culture and practice

Make proposals for publishing periodically the record of waste production of the various categories of nuclear installations in the Member States and of the use of radioisotopes outside the nuclear industry.

## **IV.2 Recycling and reuse**

Recycling and reuse of materials and equipment with a low level of radioactive contamination is a responsible management option, whenever radiological protection considerations make it possible.

This option is of particular importance in the decommissioning of nuclear installations: for a power reactor of the light-water type about 10,000 tonnes of steel and 100,000 tonnes of concrete waste will arise during dismantling and the major part of these quantities will be free, or nearly free, of artificially produced radionuclides.

The recycling and reuse option clearly requires that the potentially resulting radiation exposure of the workers and the public shall be kept within the dose limits and as low as reasonably achievable. The situations to consider are:

- Release of material after examination by the regulatory authorities, without further controls: exposure scenarios should consider recycling or reuse as possible exposure pathways in addition to disposal.
- Controlled release outside the nuclear field: the regulatory control is extended to cover part or all of the release practice. This control should ascertain that the released material (steel, concrete, for instance) is effectively transported to an authorized destination (like a smelter) or processed in a specialized licensed plant. In the latter case, conditions on the final destination of the recycled material may be imposed.



- Controlled recycling within the nuclear field; the reuse of cleaned equipment and tools in nuclear installations is routinely practised; an important route for such a practice may be recycling of steel to produce containers for radioactive waste.

There is now, at international level, and within the framework of the group of experts appointed under Article 31 of the Euratom Treaty, a wide consensus on acceptable risk and exposure values from such practices. The development of derived values (concentrations and quantities) translating these values into practically applicable clearance levels is progressing satisfactorily, particularly for the recycling of steel and other metals, where a sustained Community effort is under way.

Research is continuing to determine parameters needed to calculate the radiological consequences of the processing of metals and concrete in possible scenarios for recycling, reuse or disposal of very low-level radioactive material.

#### Action

Examine the scope for waste minimization through recycling and reuse, with particular attention to reuse in the nuclear industry

Continue experimental work and assessments of recycling and reuse practices

Continue development of recommendations on recycling and reuse at international and Community level

Examine the possibility of implementation of rules for recycling and reuse in Community legislation.

#### V. Transport: authorization and control

Radioactive substances are classified as a type of dangerous material in the United Nations' recommendations on the transport of dangerous goods. Model regulations on the transport of radioactive substances were first laid down by the IAEA in 1961 and have been subsequently subject to regular updating. The last revision dates from 1985 and has been in force since 1993. They require engineered safeguards to be "built-in" to the design of the package on the premise that there could be a severe accident in transport, and specify design performance standards which are independent of the means of transport by which the package is carried. The IAEA's regulatory system has been implemented in the national legal order of all Member States and has demonstrated its practical value in ensuring a high level of safety over many years.

At Community level a system for the administrative supervision and control of international shipments of radioactive waste is laid down in a Council Directive<sup>(9)</sup>. The situation is subject to regular reports from the Commission to the Council and the European Parliament based upon reports drafted by a standing working group in which all Member States are represented by their competent authorities. The next communication is to be transmitted before the end of 1993.

#### Action

Cooperate to ensure the continuance of an effective international regulatory system for radioactive substances

Continue to monitor this situation of transport of radioactive substances.

### VI. Optimization of the safety of radioactive waste management at Community level

A full system of radioactive waste management should comprise the activities of collection, sorting, treatment, conditioning, transport, storage, and, finally, disposal. These activities are closely linked together through numerous interactions. The optimization of the system therefore requires:

- the mature development of all the activities; this criterion is already met except in the case of the disposal of long-lived, high-level waste and spent fuel;
- careful consideration of the safety of each activity versus the global safety of the management system; as an example, the wish to minimize the transport of wastes away from their place of production must be balanced against the need to dispose of these wastes at sites ensuring a satisfactory level of confinement in the long term;
- correlation with the scope available for achieving it. Optimization at Community level offers wider approaches to safety than optimization at national level, due to the greater diversity of the available options, notably as far as underground disposal is concerned.

#### VI.1. Requirements for the safe disposal of long-lived and high-level waste

The final disposal of long-lived and high-level waste and of spent fuel when declared as a waste, has yet to be implemented. The Community has a role to play in paving the way for bringing disposal sites into safe operation, in addition to the implementation of its research programme.

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(9) Directive 92/3/Euratom of 3 February 1992 (O.J. L35 of 12.2.92)

### Action

Establish a coordinated programme with well-identified phases and objectives to demonstrate and implement underground disposal

Promote a consensus on basic safety criteria (i.e. retrievability of the waste packages, regulatory treatment of intrusion, time horizon for safety evaluation, allocation of risk limits in relation to the source, etc.)

## **VL2 Applicability of the proximity principle to radioactive waste management**

The proximity principle is an important feature of the EC strategy on non-radioactive waste management (cf. Article 5 of Directive 75/442/EEC as amended by Directive 91/156/EEC). Non-radioactive waste must be disposed of in one of the installations nearest to the source of production, in order to ensure a high level of protection for the environment and public health; this principle is mainly aimed at minimizing the transport of the waste through the Community.

The applicability of such a principle to radioactive waste has to be evaluated in the light of the specific aspects of radioactive waste management. In all cases, radioactive waste arisings remain much smaller than non-radioactive, toxic waste arisings (see I); treatment and storage facilities and final repositories for radioactive waste will have to be centralized in many cases for economic, safety and environmental protection reasons and their number will remain very limited. Finally, what is called for is an optimization of the use of radioactive waste facilities. Such an optimization may be performed at national and Community level (see VI.4) and by means of a set of various approaches, like the equivalence of waste (see VI.3).

### Action

Develop guidelines on the applicability of the proximity principle in the optimization of radioactive waste management systems on the basis of an analysis of its development or implementation in the Member States.

## **VL3 The radioactive waste equivalence concept**

Some countries, which have specialized nuclear facilities not commonly available, are processing or conditioning upon request some waste from other Member States or third countries as a result of commercial arrangements or as a consequence of spent fuel reprocessing commitments.

A strict implementation of a policy which implies the return of the precise foreign waste in its totality to the country of origin, after adequate treatment and conditioning, may be technically impossible or counter-productive in some cases. In such a situation, one may consider, or indeed may be compelled, to return an "equivalent waste". Such a course of action may under appropriate circumstances increase overall safety and therefore be considered as desirable. However, any exchange should be subject to agreement by the relevant authorities of the parties involved, and should be justified, with particular attention to safety matters.

Presently, radioactive waste equivalence is not addressed in the regulations of the EC countries, neither at Community or international level.

Guidance principles for waste equivalence matters, or/and a code of good practice should be therefore developed within the Community (see also Council conclusions - ref. 5).

Action

Guiding principles for radioactive waste equivalence should be set up and a code of good practice developed within the Community, with particular attention to safety and environmental protection matters.

**VI.4 Self-sufficiency in radioactive waste disposal and Community solidarity**

The principle of self-sufficiency in disposal is also part of the EC strategy for non-radioactive waste (Directive 75/442/EEC as amended by Directive 91/156/EEC<sup>(10)</sup> and the Council resolution of 7 May 1990 (ref. O.J. C122 of 18.5.90). The aim of self-sufficiency at Community level holds good for radioactive waste: it would be irresponsible for an advanced economic unit of the size of the Community not to dispose of its own waste. The Community is already party to agreements which prohibit the export of radioactive waste to the ACP states (IVth Lomé Convention) and the Overseas Community Territories<sup>(11)</sup>. Equally the Community would be justified in refusing to accept radioactive waste from other countries as far as it would result for ever in a net import of an additional load of radioactive material.

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(10) Article 5 (1) provides that "Member States shall take appropriate measures, in cooperation with other Member States where this is necessary or advisable, to establish an integrated and adequate network of disposal installations, taking into account of the best available technology not involving excessive costs. The network must enable the Community as a whole to become self-sufficient in waste disposal and the Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialized installations for certain types of waste".

(11) Council Decision of 25.7.1991 on the association of overseas countries and territories with the EC, O.J. L263 of 19.9.91

Self-sufficiency at national level is established policy in some Member States. Whilst Member States should certainly aim individually at being able to dispose of their own radioactive waste, it seems however regrettable, and at least premature, to deny the possibility of assistance to another country of the Community in specific cases, notably those putting at stake nuclear safety. This suggests a more open approach to the disposal question. Such an approach has been recommended by the Commission several years ago<sup>(12)</sup>; it was noted that a regional approach, involving several countries, could offer advantages especially to countries that have no or limited nuclear programmes insofar as it would prevent disposal projects, unjustified on economic grounds, being undertaken on an individual basis.

It appears therefore that the exercise of Community solidarity in these disposal matters should be kept open.

### Action

Develop a solidarity approach to disposal (especially for high-level waste).

## VII. Public information

The general public are increasingly reluctant to accept all activities which concern waste of any kind. A waste repository is seldom recognized by the general public as a necessary contribution to the setting up of a safe and ecological infrastructure in waste management.

In this situation, it is important that objective information should be available to the public. The Community has a role to play here in support of the efforts of Member States. This point is well recognized in the Community's Plan of Action for radioactive waste<sup>(2)</sup> and the Commission's research programme on radioactive waste<sup>(13)</sup>. Information material has been produced for the general public<sup>(14)</sup>. As far as individual industrial projects having a potential impact on the environment are concerned, including waste disposal facilities, a revision of the relevant Directive<sup>(15)</sup> has been recently proposed by the Commission, asking inter alia the Member States to ensure that an opportunity will be given to the public to express a opinion before a project is authorized.

The Community should continue its efforts to improve information about radioactive wastes, their inventory, their management, their localisation, and their control.

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- (12) Illustrative Nuclear Programme under Article 40 of the Euratom Treaty - COM(85)401 final of 23.7.85
- (13) Council Decision of 15 December 1989 (O.J. L395 of 30.12.89)
- (14) For example, on radiation generally, "Radiation and You"; on waste in particular, "Managing Radioactive Waste in the EC".
- (15) Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment (O.J. L175 of 5.7.85)

### Action

Continuation of activities on information as a priority; special attention should be paid to the radioactive waste issue, particularly in preparing information material

Examination of the possible role of the Joint Research Centre and of the European Agency for the environment in centralizing data relevant to radioactive waste.

### VIII. Radioactive waste management financing and structures

The principle that the polluter should pay for the cost of dealing with the pollution to which his activity gives rise is to be found in the strategy on non-radioactive waste and in Article 130r of the EEC Treaty as modified by the Single Act of 1986.

Likewise the principle has formed the basis for financing radioactive waste management and disposal by the EC Member States for many years. It has been incorporated into the laws of several countries (Belgium, France, Federal Republic of Germany, Italy, Spain) and the executive bodies or national agencies responsible for managing the radioactive waste are financed, at least in part, through payments by the waste producers.

Its proper application ensures that the costs of the safe management and disposal of the radioactive waste are considered at the same time and in conjunction with the benefits of the related practice.

In the context created by the Single Market, consideration should be given at Community level to the economic instruments adopted by Member States to implement the "polluter pays" principle, and harmonization sought where appropriate.

The irresponsible handling of discarded sources is a special issue which poses particular dangers to the public; measures should be investigated to tackle this safety problem at Community level, notably as far as the financing of the source disposal is concerned.

Radioactive waste management structures have been established for many years in the Member States with nuclear power programmes; the management of the waste (including disposal) is entrusted to an executive body or national agency; the waste operators have been also in existence for several years; they are separate from the safety authorities and are either themselves directly responsible for waste disposal or act through subsidiary or shareholder companies, by means of a public or private statute. The successive Community Research programmes on radioactive waste and the two Community Plans of Action in the field of radioactive waste<sup>(2)</sup> have been powerful instruments to establish the high degree of cooperation and convergence existing between these various bodies. The 2nd Action Plan 1993-1999, and the Advisory Committee connected with it, should increasingly constitute the Community structure where radioactive waste management issues will be discussed, and when desirable, proposed for harmonization.

Action

Review the application of the "polluter pays" principle to radioactive waste management in the Member States

Investigate Community measures to ensure the safe handling and disposal of radioactive sources

Pursue the implementation of the Community Plan of Action on radioactive waste as an appropriate structure for radioactive waste management guidance and harmonization at Community level.

C. CONCLUSION

Much has already been achieved in the field of radioactive waste and the proposed strategy has identified key areas for future action. The measures proposed will be undertaken in conjunction with those proposed in the Fifth Action Programme on the Environment and the Second Plan of Action in the Field of Radioactive Waste. The need for further action will be assessed in the light of the results of these measures.