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REPORT
drawn up on behalf of the Committee on Energy and Research

on measures to be taken in connection with the removal of radioactive waste as part of Community energy policy

and on the proposals from the Commission of the European Communities to the Council for

- a draft Council resolution on the implementation of a Community plan of action in the field of radioactive waste
- a draft Council decision on the setting up of a high-level committee of experts responsible for assisting the Commission in the implementation of the plan of action in the field of radioactive waste
(Doc. 255/77)
- a draft Council decision on the setting up of an ad hoc committee for the reprocessing of irradiated nuclear fuels
(Doc. 242/77)

Rapporteur: Mr G. FLÄMIG

PE 49.833/fin.

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English Edition

By letter of 21 July 1976 the Committee on Energy and Research requested authorization to draw up a report on measures to be taken in connection with the removal of radioactive waste and the decommissioning of nuclear power stations as part of Community energy policy.

By letter of 15 September 1976 the President of the European Parliament granted authorization. On 10 February 1977 the Committee on the Environment, Public Health and Consumer Protection was asked to deliver its opinion on the matter.

Since the Bureau had decided on 2 September 1976 to authorize the report, on 10 September the Committee on Energy and Research appointed Mr Flämig rapporteur.

The Council of the European Communities requested the European Parliament, by letter of 11 August 1977, to deliver an opinion on a communication on points for a Community strategy on the reprocessing of irradiated nuclear fuels together with a draft Council decision on the setting up of an ad hoc committee for the reprocessing of irradiated nuclear fuels and, by letter of 29 August 1977, to deliver an opinion on a communication on a Community plan of action in the field of radioactive wastes. The President of the European Parliament forwarded both requests to the Committee on Energy and Research as the committee responsible and the latter request to the Committee on the Environment, Public Health and Consumer Protection for its opinion.

On 28 September 1977 the Committee on Energy and Research appointed Mr Flämig rapporteur on these two communications and at the same time decided that, given the similar subject matter, he should incorporate the opinions into the abovementioned draft report.

The committee considered the draft report and the proposals at its meetings of 13 October and 21 December 1977, 2 February, 21 February and 1 March 1978 and at the latter meeting adopted the motion for a resolution and explanatory statement unanimously with one abstention.

Present: Mrs Walz, chairman; Mr Flämig, vice-chairman and rapporteur; Mr Normanton and Mr Veronesi, vice-chairmen; Mr Brown, Mr Edwards, Mr Fuchs, Mr Houdet, Mr Jensen, Mr Lamberts, Mr Noè, Mr Osborn, Mr Verhaegen and Mr Zywietz.

The opinion of the Committee on the Environment, Public Health and Consumer Protection is being published separately.

C O N T E N T S

A

The Committee on Energy and Research hereby submits to the European Parliament the following motion for a resolution together with explanatory statement:

MOTION FOR A RESOLUTION

on measures to be taken in connection with the removal of radioactive waste as part of Community energy policy with the opinion of the European Parliament on the proposals of the Commission of the European Communities to the Council on

- a draft Council resolution on the implementation of a Community plan of action in the field of radioactive waste
- a draft Council decision on the setting up of a high-level committee of experts responsible for assisting the Commission in the implementation of the plan of action in the field of radioactive waste
- a draft Council decision on the setting up of an ad hoc committee for the reprocessing of irradiated nuclear fuels

The European Parliament,

- having regard to the proposals from the Commission of the European Communities to the Council[1],
- having been consulted by the Council (Docs.255/77 and 242/77),
- having regard to the report of the Committee on Energy and Research and the opinion of the Committee on the Environment, Public Health and Consumer Protection (Doc. 576/77 and Doc. 576/77 Annex),
- recalling its resolutions
  - of 17 January 1973 on the establishment of the Community structures for the permanent storage of radioactive waste[2],
  - of 11 May 1976 on the need for a Community policy on the reprocessing of irradiated fuels and materials[3],

1. Recalls its previous opinions pointing out the vital need for the Community to use nuclear fission as a means of energy production in the transition from convencional sources to future forms of energy;

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[1] OJ No. C 24 , 18.10.1977, p. 8. and OJ No. C 199, 20.8.1977, p. 2

[2] OJ No. C 4, 14 2.1973 , p. 10

[3] OJ No. C 125, 8.6.1976 , p. 14

2. Emphasizes that recourse to this source of energy is permissible only if it is accompanied by complete respect for standards of public safety and environmental protection;

3. Notes that a high level of safety has hitherto been achieved in the peaceful uses of nuclear energy;

4. Stresses the Community's responsibilities in overcoming the technological, financial and, above all, psychological obstacles to the development of nuclear energy;

5. Considers, in this connection that, in the public debate on nuclear energy, the Community and the political forces should fulfil their responsibilities by providing public opinion in the Member States with as much clear and objective information as possible, especially as regards problems associated with the completion of the fuel cycle;

6. Feels that a Community energy policy should at last be drawn up and must take account of the various aspects of a nuclear energy development policy, and recalls in this connection its opinions on the creation of a Community uranium enrichment capacity, the recycling of plutonium, the Community siting policy for nuclear power stations, the reprocessing of irradiated fuels and the fast breeder option;

7. Notes that the two communications from the Commission on a Community plan of action in the field of radioactive wastes and points for a Community strategy on the reprocessing of irradiated nuclear fuels reflect this concern to incorporate the whole nuclear fuel cycle in Community energy policy;

8. Requests the Commission to extend its field of action to the problems associated with the decommissioning of nuclear power stations with a view to defining an appropriate Community strategy;

9. Emphasizes the need to establish standards for the construction of nuclear power stations so that, during their lifespan, they can be maintained and ultimately dismantled more easily; instructs the committee responsible to study these aspects more closely;

As regards points for a Community strategy on the reprocessing of irradiated nuclear fuels

10. Points out that reprocessing enables uranium and plutonium to be recovered and used to make new fuel elements;

11. Emphasizes, moreover, that the Member States' choice in favour of fast breeder reactors presupposes the availability of the plutonium needed to operate them;

12. Stresses that the problems connected with the final disposal of unprocessed irradiated nuclear fuels have not as yet been solved and that processing has the advantage of reducing considerably the volume of radioactive wastes and probably also of shortening the period for which they must be stored;

13. Considers therefore that, both to save energy resources and to protect the environment, the Community and its Member States should pursue and improve the recovery and recycling of spent fuels discharged from nuclear reactors, that is, reprocessing;

14. Considers that the drawing up of a Community reprocessing strategy offers definite advantages from the point of view both of guarantees against the diversion of nuclear materials and of the economic viability of this technology (small number of plants of optimum size);

15. Approves the setting up of an ad hoc committee to assist the Community institutions in the definition of objectives and the means to achieve them in order to put into practice the programme proposed by the Commission;

16. Notes the Commission's proposal to use the Joint Undertaking provided for in the Euratom Treaty to promote the development of reprocessing;

17. Feels that one of the long-term objectives should be the setting-up of a limited number of reprocessing centres as a preliminary to effective Community 'nuclear fuel centres';

18. Requests the Commission to take all the necessary steps, above all as regards research and development programmes and the perfecting of new processes, to ensure that:

    (a) the development of reprocessing is at all times compatible with the objectives of safety for the population of the Community and the protection of its environment,

    (b) in conjunction with the IAEA the strictest possible measures are taken to prevent the diversion and misuse of nuclear materials;

<u>As regards a Community plan of action in the field of radioactive wastes</u>

19. Recalls that the principal aim of radioactive waste management and storage must be to ensure that the population and the environment are protected against the radiological hazards associated with such waste;

20. Notes the major progress achieved in radioactive waste management as a result of the research and development programmes of the Member States and the Community;

21. Considers, however, that research and development into waste management should be intensified still further and involve increasingly close cooperation at Community level;

22. Emphasizes, as it did in 1973, that the numerous problems connected with radioactive waste (industrial, financial, ecological, social) extend beyond national borders and can be solved only within a wider context, thus avoiding the need for individual Member States to take costly measures for final disposal and preventing the multiplication of radioactive waste depositories and an increase in the associated expenditure;

23. Feels that the Community plan of action reflects this aim of organizing the preparation of long-term Community solutions to the problem of radioactive waste;

Requests the Commission in particular to support all measures being taken in the Community to industrialize solidification processes for long-lived radioactive wastes;

24. Emphasizes the importance of completing - during the period covered by the Community actionplan - research into geological formations suitable for storing radioactive wastes and studies to determine the properties of the containers that will have to hold them and the procedures for depositing them;

25. Considers the course of action outlined in the preceding paragraph to be the only one at present feasible; invites the Commission, however, to follow with the greatest attention studies and experiments aimed at finding other means of storage for long-lived radioactive wastes or at shortening drastically the period of their radioactive lives;

26. Calls on the Commission to harmonize the safety standards and security measures relating to radioactive waste as soon as possible and to monitor their application;

27. Welcomes the Commission's intention to go beyond its role as coordinator of a number of research programmes and to ensure total cooperation at Community level on all the problems relating to radioactive waste management and storage;

28. Is concerned, however, at a certain lack of proportion between these objectives and the means proposed to achieve them;

29. Regrets that in its proposal, the Commission limits Community action to studies and analyses in connection with a possible Community storage network for radioactive waste and emphasizes that the size of the problem would justify more ambitious proposals;

30. Feels that the setting up of this network, under the joint responsibility of the Member States and the Community, represents the vitally important first stage in the internationalization of waste management, whose public service role would be incontestable;

31. Considers, moreover, that the Commission's proposals on periodically informing the public, the need for which has been repeatedly emphasized by Parliament, are inadequate, and expresses reservations about using the Official Journal of the Communities for this purpose;

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32. **Approves, subject to the above reservations,** the proposals submitted to the Council;

33. Instructs its President to forward this resolution and the report of its committee to the Council and Commission.

B

EXPLANATORY STATEMENT

I. INTRODUCTION

1. Over many years the European Parliament has had occasion in various resolutions to state its position clearly in the debate concerning the peaceful uses of nuclear energy. It has repeatedly asked the Community authorities to apply the policies and instruments necessary for the development of nuclear energy. In the view of the European Parliament, such development must take place under conditions of optimum safety and security and should be of a scope sufficient to reduce appreciably the Community's energy dependence and ensure long-term energy supplies.

2. The conclusion reached in the continuing analysis undertaken by the European Parliament is that it is absolutely essential for the Community to have recourse to nuclear fission to effect the transition in energy generation from the traditional sources to the energy sources of the future (including fusion). This is even more necessary in connection with the present situation, in which the Community is too dependent for its energy supplies on hydrocarbons, with the risks that this involves both at economic and political levels. While emphasizing the importance for the Community of developing the use of new forms of energy and combating waste, the European Parliament has always been aware that such measures alone are and will not be enough and that the use of nuclear energy is inevitable to cover energy needs.

3. The European Parliament has also made its position clear on the question of whether one should rely totally or partially on nuclear energy. In its resolution adopted on 13 January 1976[1], it pointed out that 'the various constraints governing site selection should lead above all to a review of the scope of certain current energy programmes'

4. The European Parliament has not limited itself to reaffirming its favourable attitude to the use and development of nuclear energy for peaceful purposes. It has dealt with the problems arising at the various stages of the nuclear fuel cycle, always with a view to Community action as part of an energy policy.

It has considered in succession the following:

- uranium enrichment capacity: resolution of 16.3.1973 (Doc 296/72 - Noè report) and resolution of 23.3.1974 (Doc. 38/74 - Noè report)

- plutonium recycling: resolution of 11.7.1974 (Doc. 163/74 - Noè report)

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[1] OJ No. C 28, 9.2.1976

- nuclear power station siting: resolution of 13.1.1976 (Doc. 392/75 - Walz report) and resolution of 7.7.1977 (Doc. 145/77 - Walz report)

- irradiated fuel reprocessing: resolution of 11.5.1976 (Doc. 69/76 - Noè report).

5. Finally, in 1973, the European Parliament examined the problems associated with the storage of radioactive waste. In adopting the resolution presented on behalf of our committee by Mr Ballardini on 17.1.1973, the European Parliament emphasized the need to establish Community structures for the final disposal of radioactive waste.

It can therefore be seen that in the field of nuclear energy the European Parliament has adopted a logical and coherent framework within which it has progressively studied the various stages of the nuclear fuel cycle.

6. The purpose of the present report is, taking account of developments since 1973, to resume consideration of the problems associated with the storage of radioactive waste and, in parallel, those raised by the dismantling of power stations, while drawing the lines of a Community policy in this matter.

7. In view of the complexity of these questions it was essential for your rapporteur to have the official views of experts and to visit the installations or research centres concerned with the treatment and/or storage of radioactive waste. Thus, following an exchange of views with the relevant officials of the Ministry of Research of the German Federal Government, your rapporteur visited the following installations:

- BNFL's reprocessing plant at Windscale

- the COGEMA reprocessing plant at La Hague

- the Eurochemic pilot reprocessing plant at Mol

- the GWK pilot reprocessing plant at Karlsruhe

- the GSF pilot plant for the disposal of radioactive waste at Asse.

These visits were in each case preceded by descriptions and explanations given by the officials of these centres at the request of your rapporteur.

Finally, the work of your rapporteur was made easier by the fact that the relevant departments of the Commission of the Community were always ready to help.

8. Your rapporteur would like to thank all these people who, by being always available to help, enabled him to draw up this report under excellent conditions. He would also like to emphasize the welcome which he was given everywhere and which helped to make the exchanges of views particularly fruitful.

The present report will deal in succession with the following aspects:

- General information on radioactive waste
- Waste management
- Dismantling
- The Community's role

9. Consideration of these various points will also include reference to the communications which the Commission of the Communities has submitted to the Council (15 and 26 July 1977). The communications relate to

- a Community plan of action in the field of radioactive wastes (COM(77) 397 final)
- points for a Community strategy on the reprocessing of irradiated nuclear fuels (COM(77) 331 final)

II. GENERAL INFORMATION ON RADIOACTIVE WASTE

A. Origin of waste : reprocessing

(a) Purposes of reprocessing

10. The operation of nuclear fuel reprocessing constitutes the principal source of waste. The purpose of this operation is to separate in the irradiated fuel the fissile materials which can be reused (uranium and plutonium) from the 'waste', which consists essentially of fission products and transuranic actinides. The effect of the chain reaction on the fuel elements in the reactor is to produce a gradual depletion of their fissile material content and an accumulation of fission products. Together, the two processes cause a loss of reactivity in the fuel, which must then be discharged and replaced by new fuel elements.

After storage in water at the reactor site, the spent fuel elements are placed in containers called 'flasks' and sent to a reprocessing plant. There the elements are placed in a 'pond' to await reprocessing. The time spent in the pond depends on a number of factors:

- technical factors (risk of corrosion of the cladding)
- industrial factors (the reprocessing capacity of the plant)
- economic factors (the desire of the electricity producers to recover the uranium and plutonium as soon as possible).

The radioactivity of the elements in the pond decreases to a considerable extent over a number of years, after which it falls only slowly.

11. The first operation after interim storage is the decladding of the nuclear material. This operation differs according to whether the fuel element is from a graphite-gas reactor (Magnox elements) or a light-water reactor (oxide elements).

The real reprocessing begins after this operation. This consists of various physico-chemical operations involving:

- dissolution of the fuel,
- clarification of the solution obtained,
- separation of the uranium, plutonium and fission products,
- purification of the uranium and plutonium until they are sufficiently pure for re-use,
- collection and conditioning of the wastes resulting from these operations.

The purpose of the treatment is therefore to separate the various products which make up the spent fuel, i.e. uranium, plutonium and the fission products which, in fact, constitute the radioactive waste.

(b) Need for reprocessing

12. The fact that this radioactive waste results from the reprocessing operation does not mean that this process must be banned, which some people have clamoured for, at the same time ignoring a number of associated questions. On the one hand, as Mr Noè has shown in a report already referred to, reprocessing techniques have already been thoroughly tested. Secondly, no one has yet answered the question of how to store non-reprocessed spent fuel. Finally, reprocessing has the not inconsiderable advantage for the energy policy of the Community of allowing the uranium and plutonium to be recovered for the manufacture of new fuel elements, thus reducing to that extent the need for imported uranium.

13. Another criticism often made of reprocessing concerns the production of plutonium and the associated dangers. In this connection it should first of all be remembered that the plutonium produced in light-water reactors and separated from the uranium following reprocessing would be of poor quality for the manufacture of nuclear weapons. After two recycling operations it would even be unsuitable for such use.

Secondly, there are at least two outlets for this plutonium in the field of energy production. Tests are now in progress on the behaviour of fuels containing plutonium in light-water reactors. Also, since the Member States of the Community have opted for the breeder system, provision must now be made for the plutonium needed to start them. In order to reduce the risks of plutonium diversion, the possibility is at present being examined of forming, during the reprocessing operation itself, a uranium-plutonium mixture which could be used as fuel for the breeders.

14. Even though the breeder system at the moment seems to have been abandoned by the United States, it should not be forgotten that they are at present devoting to research in this field a budget equivalent to those of France, the Federal Republic of Germany and Great Britain put together.

(c) M.U.F. (Material Unaccounted For)

15. Your rapporteur would like to give some information on the so-called losses of fissile material which have been mentioned in regard to the plutonium obtained after reprocessing.

Following a discussion with several experts, it would seem that these reports are based on a deplorable misconception. In fact, the quantity of fissile materials present in the irradiated fuels cannot be determined very precisely on the basis of existing physical methods. Precise measurements, using chemical methods, are possible only after the fuels have been dissolved. Hence, neither the quantities actually entering the reprocessing plant nor the quantities of fissile materials contained in the wastes can be known with absolute certainty. This is why there is a discrepancy between the quantities as calculated when entering the plant and the quantities which actually leave the plant after reprocessing as final products or as contaminants of the wastes.

'Material Unaccounted For' (MUF) is the term used to denote this discrepancy. To consider that the MUF constitutes a 'disappearance' of plutonium is either a case of ignorance or of deceit.

B. Problem of liquid and gaseous waste and the integral dose received by the staff and the surrounding populations

a) Gaseous effluent

16. Reprocessing plants in operation are fitted with ventilation and filtration systems which efficiently retain dusts and aerosols but generally do not yet have very elaborate systems to fix all the radioactive fission gases. Nor has it been necessary on health grounds to trap these gases completely in the reprocessing plants which hitherto have been processing gas-graphite reactor fuel elements, which have not been irradiated very highly and which have been cooled, or fairly limited quantities of oxide fuels from power reactors.

The levels allowed by the ICRP have never been exceeded. Spent fuel contains two important iodine isotopes. Iodine 131 has a short half-life and is allowed to decay before reprocessing. Iodine 129 has a very long half-life and will be important in future when high burn-up oxide fuels which contain a great deal of iodine are being reprocessed.

17. Extensive research programmes are at present in progress at the various national institutes concerned and are being conducted with close cooperation between them. The research is concerned in particular with two separate problems:

- the need to trap iodine with yields likely to improve observance of the discharge standards in force in plants processing water-reactor fuels
- a technical solution to the problem of complete trapping and conditioning of all the fission gases (primarily inert gases and tritium) with a view to possible tightening up of standards, or the widespread adoption of the principle of 'as little discharge as possible'.

18. Looking at the present situation, we find that, in all the reprocessing centres in operation, the air discharged is first purified by means of filters with a high retention capacity. Traps based on silver salts are currently under study, and a number of installations are already equipped with experimental systems. These are capable of eliminating 99.9% of the iodine contained in the treated air.

Krypton 85, a chemically inert gas, is allowed to be discharged from the reprocessing centres at La Hague and Windscale. It is considered by the authorities concerned that at present the discharge of very small quantities into the atmosphere does not present any difficulties but according to an OECD report a problem may arise after the year 2000. In addition, in assessing this problem, the favourable geographical situation of Windscale and La Hague have to be taken into account (at the edge of the sea, strong favourable winds) so that this gas can be discharged without difficulty into the atmosphere.Conditions are probably less favourable at the continental sites, e.g. at the Eurochemic Centre at Mol, Karlsruhe and the site at Gorleben, the proposed location of a commercial reprocessing plant in Germany. In the Federal Republic of Germany, the Committee on Radiation Protection has asked for krypton to be removed. It is estimated that an experimental krypton separation plant would cost about DM 20 million and an industrial plant DM 100 million. Tritium is usually found in the form of tritiated water. No industrial extraction technique has yet been developed. It is, however,

possible to separate the effluents containing tritated water from the plant's other effluents. These tritiated solutions are concentrated in relatively small quantities which, after separation from the other contaminants, can be discharged or, better still, incorporated in concrete.

b) Liquids discharged

19. In the treatment of liquid wastes low-active effluent is produced. In the various reprocessing plants at present in operation this can only be discharged after permission has been given and subject to the control of the responsible authorities. In addition, such liquids can only be discharged within the limits of standards established at international level. In the two commercial reprocessing plants in operation (Windscale and La Hague) liquid discharges have always remained below these limits. To allow dilution effluents are discharged at high tide via pipelines which extend several kilometers out to sea.

c) Environmental monitoring

20. Around the reprocessing plants, permanent monitoring is undertaken by authorities independent of the nuclear industry. All results are regularly made available to the public.

This monitoring is carried out in the following areas:

- atmospheric monitoring (with the help of meteorological stations)
  - . dust in suspension in the air
  - . air
  - . rain water
- hydrological monitoring (by sampling and analysis)
  - . underground water
  - . watercourses
- ground monitoring (by sampling and analysis)
  - . pasture land
  - . milk
  - . field crops and other food products
- marine monitoring (by sampling and anlysis)
  - . sea water
  - . beach sand
  - . marine sediment
  - . algae, crustaceans, molluscs
  - . fish
- protection of persons (staff of the reprocessing plant and surrounding population)

21. The staff of reprocessing plants are subject to strict monitoring carried out by the radiological protection services. The results of these tests show that the integral doses received by the staff are well below the

international limits. On average, staff are subject to a dose of 300 millirems per annum (2,500 millirems for staff most exposed) whereas the permitted dose is 5,000 millirems.

22. In connection with the 'risks' to which the population living near nuclear industries would be subject, a study carried out by the French C.E.A. arrives at the following figures:

Mean annual exposure of the population to ionizing radiation
for a man whose natural internal radioactivity is 25 millirems

1) Natural exposure

- from the earth: 50 millirems
- from cosmic radiation: 50 millirems

2) Artificial exposure

a) Miscellaneous sources
- x-ray examinations: 70 millirems
- television sets: 3 millirems
- luminous dials of watches etc.: 1 millirem (approx.)

b) Effects of the nuclear industry for very limited groups
- from a nuclear power station: 2 millirems
- near the La Hague plant
  - through the atmosphere 5 millirems
  - via the sea 1 millirem
  - the ground negligible

C. The various categories of waste

23. As we have already indicated, this report will only deal with problems raised by radioactive waste resulting from reprocessing. Neither the quantities nor the characteristics of the radioactive waste from other sources (uranium extraction, hospitals, laboratories, nuclear power stations) present any major problems when it is being disposed of.

24. As in the case of other industries, waste in the nuclear industry comes either in liquid, solid or gaseous form. Its radioactivity, its potential hazard and time required for it to become harmless[1], depend on the radionuclides which it contains. In practice the maximum radioactivity is of of the order of some 10^6 Ci/m^3 (in which case the waste gives off considerable heat). The minimum radioactivity considered is of the order of 10^{-6} Ci/m^3 (therefore lower than that of water from thermal springs).

[1] That is, it has no radiological effect on the environment within the meaning of the Member States' regulations on health protection drawn up in accordance with the Euratom radiological protection standards.

On this basis nuclear waste can be classified into the following categories:

- liquid waste
  - of low activity, when the total radioactivity of the radionuclides present is between $10^{-6}/10^{-7}$ and 10^{-1} Ci/m^3 of waste
  - of medium activity (between 10^{-1} and 10^3 Ci/m^3). This waste requires special protection during handling.
  - of high radioactivity (greater than 10^3 Ci/m^3). This type of waste requires cooling and special precautions for containment.

- solid waste

A classification similar to that for liquid waste can be adopted. The associated problems (protection against radiation, cooling) are the same as for liquid waste.

- gaseous wastes

These wastes form a class apart since, with the exception of iodine, most of their radioactive components are of low radiotoxicity and become only slightly concentrated, if at all, in the natural environment. Techniques now exist for retaining iodine, and several Community countries are currently engaged on major development projects aimed at perfecting retention techniques for the other components of gaseous waste (krypton, tritium, carbon).

D. Urgency of the need for disposal of nuclear waste

25. Although at present no Member State of the Community (nor any other state in the world) is undertaking the final disposal of its nuclear waste, the reason is not absence of the scientific and technological knowledge needed for solving the problem. Far from it. On the contrary, as a result of research programmes carried out since the beginning of the nuclear age, a number of disposal techniques have been studied and tested. However, all organizations concerned consider that permanent storage is not needed so urgently that a final solution has to be presented today. That is why they now prefer to undertake interim storage and undertake more comprehensive investigations of different geological formations. Because of the small volume of such waste, interim storage above ground presents no immediate problems.

a) Estimate of quantities of radioactive waste

26. In its communication to the Council on radioactive waste (COM(77) 397 final), the Commission gives some information as to the volume of the waste.

Estimate[1] of quantities of spent fuel and radioactive wastes accumulated from 1975 to 1980, 1990 and 2000 for the whole Community

		1980	1990	2000
- high activity and longlived by-products	- solidified waste	less than 100 m^3	thousands of m^3	about 20,000 m^3
	- spent fuel elements awaiting processing	2000 t uranium content	10,000 to 15,000 t uranium content	
- low activity by-products	- processed waste	tens of thousands of m^3	hundreds of thousands of m^3	about one million m^3

27. The low-activity wastes constitute the bulk of the volume produced[2]. Their storage, during which the waste becomes less noxious, does not pose any particular technical difficulties.

There is a far smaller volume of highly active and long-lived wastes (some thousands to hundreds of thousands of years). These nevertheless constitute the main radioactive waste problem. They have to be treated, and isolated from the biosphere for very long periods of time.

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1 This estimate can only indicate orders of magnitude, because the actual production of waste depends on the operation of the nuclear power plants, the commissioning dates of the reprocessing plants, the volume reduction factors associated with the waste treatment technologies etc.

2 This volume, however, is still low compared to the wastes produced by a conventional power station. The amount of ash produced by a coal-fired power station is about 400 times greater.

III. WASTE MANAGEMENT

A. Aims

28. Most Member States have adopted research and experimental programmes on the management of radioactive waste. These programmes are particularly extensive and advanced in the Member States which already have commercial reprocessing plants (France and the U.K) or pilot reprocessing plants (Federal Republic of Germany). Belgium, which has the OECD (Eurochemic) pilot reprocessing plant, has also undertaken a substantial programme of research, particularly with a view to the Eurochemic centre being taken over by the Belgian Government.

29. The purpose of these programmes is to achieve a system of radioactive waste management which (for each category and depending on the quantities and half-lives of radionuclides) will ensure that these radionuclides do not reach the biosphere during the period in which they present a potential radiological hazard.

B. Methods

30. To achieve the above objectives there are two possible methods:

(a) The first consists in isolating the waste from the biosphere at least until its radioactivity has decayed. This is known as the delayed discharge strategy. It involves containment for lengthy periods, which in itself (for economic reasons) calls for the development of techniques for further reducing the volume of the waste. In addition, if the waste is highly radioactive, cooling arrangements for removing the heat of radioactive decay and shielding against radiation will be necessary.

(b) The second method (which is allowed in some Member States) consists of discharging low-level liquid or gaseous waste at controlled rates into the environment in such a way as to take advantage of natural dilution in the environment and to ensure that the resulting concentrations will not constitute a significant hazard to man.

C. Concentration of wastes: techniques applied or under consideration

31. These techniques vary according to whether the wastes are liquid, solid or gaseous and according to the characteristics (specific activity, volume, nature of the radionuclides contained, etc.) Many of these techniques are now proven and have been used for a long time in other industries (particularly the chemical industry).

(a) The liquid sources can be separated into two phases: one of small volume retaining the greater part of the initial activity, the other of large volume and very low activity, which after preliminary treatment can be discharged into the environment.

(b) For solid wastes, the concentration process can be

- a simple volume reduction process by compression
- a process of dry or wet chemical combustion

In addition, the end product is usually incoporated in concrete or bitumen, thus sealing off the radioactive contaminants.

(c) For the gaseous wastes, the process consists in separating certain radioactive gases from the flow of gas to the stack, using chemical processes. After separation the gases are stored until the radioactivity decays.

D. Containment, temporary storage and conditioning

32. By definition, containment of radioactive wastes must ensure its isolation from the biosphere for a period extending beyond that needed for its radioactive decay. Very often however, the form which this waste takes before treatment is not suitable to ensure such containment satisfactorily without further treatment. In this form the waste is only suitable for temporary storage. To convert it into a form suitable for final storage, it must then be conditioned to satisfy the requirements of safety and protection of the environment. In the case of liquid gaseous waste, this conditioning involves solidification.

(a) Highly active liquid waste

33. This waste, which comes from the first cycle of the reprocessing plants, has a high initial specific activity of the order of several million curies/m^3 for the fission products and of the order of 10 times less for the actinides. The half-lives of the radioelements present extend from seconds to millions of years.

This precludes both the possibility of dilution and temporary containment followed by discharge. Containment of the waste for a more or less unlimited period is therefore necessary and this is known as the disposal of waste.

So far this waste has been produced in moderate quantities and stored in liquid form in stainless steel containers equipped with a great many safety devices (double walls, agitators, cooling systems, etc.). This method is acceptable for periods of several decades.

34. Techniques involving solidification and incorporation in special glasses (vitrification) are at present being tested in the United Kingdom, France and the Federal Republic of Germany. An industrial plant has been in operation for a short time at Marcoule (France). A second industrial plant is planned for La Hague in 1982. Other units based on similar processes are

planned in the United Kingdom and in Germany. The glass blocks (150 kilograms at Marcoule) are contained in welded stainless steel leaktight containers. These are placed for several years in an interim storage installation consisting of ventilated cavities to allow considerable radioactive decay to take place prior to disposal.

(b) Low and medium-active liquid and solid waste

35. After treatment this waste will generally be reduced to a sludge or sediment comparable with solid waste.

Such waste can be incorporated in concrete, bitumen or thermosetting resins.

Because of its characteristics, the use of concrete is limited to low-active waste. Bitumen and thermosetting resins are suitable for the incorporation of waste of low or medium activity.

According to its characteristics, this waste is either stored in special concrete buildings with air filtration or buried directly in the ground after packing in plastic and placing in drums (very low active waste) on specially supervised sites.

(c) Highly active solid waste

36. The waste from spent fuel element cans, reactor components, unserviceable contaminated equipment etc. will be decontaminated and packaged in a form suitable for disposal.

(d) Gaseous waste

37. It has already been pointed out that research programmes are now under way to develop techniques for the containment of gases which are at present discharged into the atmosphere. (With the planned growth in nuclear power such containment would not be necessary on radiological grounds until the year 2000.) These techniques would allow the gases to be stored for radioactive decay. The doses to which the population is subject would therefore reduce as technology progresses, even though they are now already lower than the dose limits recommended by international authorities (ICRP).

E. Discharge

38. All discharges of radioactive wastes into the environment are subject to the Euratom directives for the Member States of the Community and the recommendations of the ICRP as regards radiological protection.

Disposal at sea

39. One of the forms of disposal at present in use consists of dumping drums containing low-active solid waste incorporated in concrete or bitumen at the bottom of the deep ocean. Such operations are carried out under the control of the OECD Nuclear Energy Agency (NEA). Since 1969 the NEA has established a form of cooperation between its member countries, participating in the evaluation and selection of deep sites (4,000 to 5,000 metres) 600 miles west of the European coast, and by drawing up technical specifications relating, for example, to the containers which are to be dumped. Since 1967 France, Italy, Sweden, the United Kingdom, the Netherlands, Belgium and Switzerland have dumped some 46,000 tonnes of drums filled with concrete containing low-active waste (the only waste which is allowed to be dumped under the rules of the International Atomic Energy Agency).

40. Since then a new decision has been taken by the NEA (July 1977). This established a multilateral system of consultation and supervision for the dumping of waste. Henceforth any country proposing to dump waste will have to give advance notice and details to the NEA, which will inform the other countries which are party to the agreement and will determine whether the project is in accordance with the rules in force. Expert groups may be consulted. The dumping operations themselves will be under the supervision of an official of the NEA, who, if he considers it necessary, may suspend them. Finally, the NEA will take part in the radiological supervision of the dumping grounds.

F. Disposal of highly active waste

41. It has been pointed out above that disposal (containment outside the biosphere for a virtually unlimited period) is necessary for highly active waste because of its high concentration of radionuclides.

At present, research on such disposal is concentrated on isolation in geological strata. Systems involving extra-terrestrial disposal are no longer being considered.

Geological isolation

42. The principle of disposal by geological isolation is the establishment of a further barrier between the waste and the biosphere. Consequently, in order to rejoin the biosphere, a radioelement would have to pass through the following:

- the barrier produced by the process of vitrification,
- the barrier resulting from containment in cavities at a depth of several hundred metres within a stable, homogeneous formation with no water run-off,
- the geological strata surrounding the formation and separating it from the biosphere.

43. Three general types of formation have been identified: thick glacial layers, ocean beds and the continental geological formations. Research and investigation into the first two possibilities has not as yet progressed very far. On the other hand, research and experimentation into continental geological formations is at a highly advanced stage.

44. There are three types of continental geological formation which provide guarantees of stability:

- salt formations,
- thick clay formations,
- crystalline formations (granite)

The salt formations have numerous advantages:

- no circulating water,
- good mechanical strength allowing the necessary excavation (without underpinning)
- good thermal conductivity to assist in removing decay heat,
- geological stability.

As part of the allocation of research between the Member States of the Community, these formations have been under investigation for about ten years in the Federal Republic of Germany which has a pilot centre at Asse (see following paragraph).

Clay formations offer advantages of impermeability and outstanding ion exchange properties, which makes them excellent geological barriers. This type of storage is under investigation in Belgium and in Italy. In Italy it is proposed to experiment with the storage of medium-active waste before going on to the storage of highly-active waste.

Granite formations are attractive because of their mechanical strength, but must be carefully investigated for faults. France and the United Kingdom are particularly interested in research into these formations.

G. Experiments at the Asse experimental store

45. The former salt mine at Asse was chosen as the Federal Republic of Germany's experimental store for radioactive waste. As part of the R + D work the Asse Centre is particularly concerned with all the problems involved in the disposal of radioactive waste. Those techniques proven at the Asse pilot centre will subsequently be adopted in the planned commercial disposal centre.

46. In the north of the Federal Republic of Germany there are more than 200 salt mines, of which only 20 are still in operation. The old Asse mine is in a dome of salt 2 kilometres long and 50 to 60 metres wide. It has 13 galleries in which there are a hundred caves. The volume of each of these caves is about 36,000 m^3 (60 metres long, 40 metres wide, 15 metres high).

47. In the first experiments carried out at Asse these caves are being used for the storage of low-active waste. So far 83,000 containers have been stored at Asse as part of the storage tests. Experiments on methods of storing medium-active waste have been started. One of the techniques to be tested consists in filling cavities 10,000 m^3 in volume via shafts. At the moment the medium-active waste is still being loaded from above in sealed storage chambers. Above the chamber is a transfer station from where the drums are lowered from the shields into the chambers.

Another technical study is concerned with the possibility of mixing low- and medium-active waste with cement and pouring this into a chamber, so that everything is combined into a monolithic block.

When the Federal Republic of Germany has a vitrification plant for highly active waste, the feasibility of disposing of such waste in salt mines will also be investigated at Asse. A storage system is under consideration for this type of disposal. The experiments are however being designed so that recovery is possible.

After intermediate storage this waste would be placed in suitably arranged shafts (50 metres deep and 10 metres apart) sunk into the salt bed. At the centre of the shaft the temperature would be 240° initially, reducing to 100° after 40 years.

H. Transmutation

(irradiation of transuranium elements to convert them into short-lived fission products)

48. It has been seen above that the potential risks which might be involved in the return of certain radionuclides to the biosphere are essentially due to fission products (for periods less than 1,000 years) and actinides (for periods of hundreds of thousands of years). Attempts are now being made to separate these two components of highly active waste. If this is possible, after 500-600 years the radioactivity of the fission products would decay and the storage period be accordingly reduced. The part containing the actinides (a very small quantity) would be irradiated in reactors, and these long-lived radioelements could then be converted either into non-radioactive elements or into short-lived radioelements. This process is described as transmutation.

Present research is aimed at achieving such separation in the laboratory and examining the possibility of transferring this to the industrial level and the effect of such a process on the safety of the fuel cycle. Transmutation would probably give rise to increased production of medium-active waste.

IV. DECOMMISSIONING

49. By decommissioning is meant all the operations carried out from the time when a nuclear installation has been finally shut down.

Although there is considerable experience already in this area in the Member States of the Community (following the shutdown of experimental and prototype reactors), all the experts are unanimous in considering this experience as insufficient for drawing up a decommissioning philosophy. At the moment therefore we only have 'guidelines' for these operations.

A. The guidelines

50. These are concentrated mainly on three types of action. In the first place experimental dismantling operations must be carried out on the installations which have been shut down. In a second stage, decommissioning techniques should be developed as a result of experimental work. Finally, in the design of new nuclear installations we must take into account now the technical and material requirements of subsequent dismantling operations. This means that we must bear in mind today the dismantling problems which will arise in the medium and and long term (30 years in the case of reactors).

B. The various possibilities for decommissioning

51. In one of its recommendations the International Atomic Energy Agency mentioned three possibilities for decommissioning:

- placing the installation in a cocoon

- above-ground demolition

- complete removal

Most Member States consider that the problem of decommissioning and dismantling should be tackled as a priority from the point of view of safety[1]. This has led the IAEA to identify three possible levels in the decommissioning of an installation:

1. shutdown accompanied by permanent surveillance of the active zones
2. containment of all radioactive material in the installation after its conversion into a storage unit, which would allow partial use of the site
3. removal of all radioactive material to another storage installation, which would allow unrestricted re-use of the site.

C. Waste produced by decommissioning

52. A decommissioning operation inevitably produces a large quantity of waste. In most cases and especially as far as reactors are concerned, the management of such waste would not present any problem after a period of fifty years, but it is impossible to wait so long because of the dangers of corrosion and rusting of materials and the associated consequences. Deferment of a dismantling operation is therefore to be discouraged. Once such an operation has been completed, the activating materials can no longer be recovered, whereas some contaminated materials can be re-used after treatment.

53. When the problem of disposal of waste arising in decommissioning is discussed with specialists, it is apparent that this problem is at present in a stage of development and that no industrial technique has yet been adopted.

54. The requirements to be observed are obvious: this waste must be treated and managed so as to prevent any irradiation of the environment and to avoid any escape of radioactivity. To take a PWR reactor vessel as an example, dismantling would consist in cutting it up and placing the parts in a 'cocoon'. The activity of the radioactive elements in a PWR (including cobalt-60 and nickel-59) would mean that storage for a period of about 500 years would be required. It must be emphasized, however, that the waste resulting from dismantling operations as such has very much the same properties as the waste obtained from the operation of the nuclear installations. Consequently, the same processing and storage techniques are appropriate to the wastes from both sources.

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[1] Above-ground demolition may seem attractive at first sight but certainly does not satisfy safety criteria. In this case the essential monitoring would be difficult to carry out. Furthermore, in the case of an accident, the bottom of the reactor might be in contact with the groundwater. The reactor containment must always be open to inspection.

55. As we have already pointed out, the decommissioning of nuclear power stations is at present still in the research and development stage. At Community level a committee of experts has been set up on dismantling, whose function is in particular to ensure coordination of research and development of these techniques. This is being carried out in close collaboration between the various institutions or national centres, even though the techniques under examination differ according to the characteristics of the national nuclear installations. For example, the United Kingdom has put the emphasis on problems associated with the decommissioning of gas-cooled reactors.

Estimates of the cost of decommissioning are at the moment difficult to establish, since in particular no final solution has yet been devised at industrial level. As a general rule it is envisaged that the cost of dismantling would represent about 15% of the initial capital investment.

V. THE COMMUNITY'S ROLE

56. Within the framework of an outline Community policy, the Community has defined and set in motion, often in a fragmentary manner, certain projects aimed at the promotion of civil nuclear energy. These projects are concerned mainly with research. In parallel, and to provide the framework for these research programmes, the Community, through resolutions of the Council or communications submitted by the Commission, has not only taken a stance in favour of the development of nuclear energy but has also tackled specific aspects, such as

- nuclear fuel supplies for the Community

- Community uranium enrichment capacity,

- plutonium utilization,

- nuclear energy and protection of the environment, etc.

In its two recent communications submitted for our consideration the Commission proposes that the Council should define a Community plan of action in reprocessing and the treatment of radioactive waste.

57. In analysing the two communications and the draft resolutions accompanying them, our committee must tackle the problem of the level at which the political and legal responsibilities associated with reprocessing and the management of radioactive waste should be set within the Community.

A. Community research programmes

58. The Community research programmes on nuclear energy are too numerous for your rapporteur to give a complete survey here. Moreover, the subject of this report (reprocessing, radioactive waste and decommissioning) do not call for

a general analysis of nuclear research. There will therefore be no discussion of research programmes on

- plutonium

- reactor safety

- thermonuclear fusion

- high-temperature materials

The Community at present has a research programme on radioactive waste, and, as part of the second environment programme, is preparing a research programme on the decommissioning of nuclear installations.

(a) Research programme on radioactive waste

59. Community action as regards research on radioactive waste is aimed at

- promoting exchange of information,

- avoiding useless duplication by joint efforts on certain subjects,

- supplementing the work of the Member States, in particular by examination of long-term alternative solutions,

- promoting or speeding up, by financial participation, the development of certain technological solutions which are already under consideration in the Member States,

- directing technological developments towards increasingly safer solutions by an objective evaluation of the risks.

60. With these objectives in mind, the programme is centred around:

- the work of the laboratories in the Member States on the treatment of waste, ensuring that there is coherence in this work,

- the work of the departments of the Commission (mainly the JRC) on the separation and transmutation of actinides, an advanced strategy which possibly needs to be examined for the long term,

- work in progress or planned on the final storage of waste in geological formations,
- studies concerned with evaluating the long-term risks which might be involved by the final storage of waste.

This programme is being carried out under the responsibility of the Community, with the aid of a single consultative management committee made up of national delegates, on the basis of the direct action and indirect action system.

61. Studies associated with the long-term risks caused by waste and with the separation and transmutation of actinides are to be carried out under the direct action system. The first multiannual direct action programme on radioactive waste (1973-1976) was given a budget of 21 m u.a. Carried out mainly at the Ispra Centre, it was concerned with

- the separation of fission products in the irradiated fuel by means of the 'Saltex' process,

- the chemical separation and nuclear transmutation of actinides,

- instrumentation for monitoring and measuring alpha-emitter waste,

- preparatory studies for evaluation of the long-term risks of storage of radioactive waste.

62. A second multiannual programme (1977-1980) has taken over, maintaining the guidelines of the previous programme and emphasizing its importance since a much greater budget has been allocated.

The programmes concerned with the treatment of radioactive waste and final storage in geological formations are carried out in the form of indirect actions.

Joint financing contracts are concluded between the Community and public or private organizations in the Member States. The first indirect action programme was approved by the Council of Ministers in June 1975 and will terminate at the end of 1979. The Community's contribution to the financing of the programme amounts to 19.16 m u.a. and represents more than 40% of the total amount for the programme. This includes:

- work on the treatment of radioactive waste with a view to its storage and disposal,

- work on storage of such waste and Community action on its disposal in geological formations,

- strategic studies aimed at assessing the value of an advanced management model (separation and transmutation of actinides),

- a review of the problems raised by the management and disposal of radioactive waste for which no solution is provided under the present legal, administrative and financial provisions and suggested solutions,

- study of the principles governing the management of radioactive waste at technical level.

63. Permanent working parties, made up of the national officials directly concerned with the research, follow up and discuss with the Commission representatives the progress of the work to ensure that the laboratories are immediately informed and that there is effective coordination. In January 1977 about thirty research contracts were signed or in the process of being signed, representing a financial commitment of some 30% of the indirect action budget.

(b) Research programme on the decommissioning of nuclear installations

64. As part of the second environment programme the Commission is planning a research project on the decommissioning of nuclear installations in the form of an indirect action with the following objectives:

- comparison of the decommissioning techniques in existence or under development, both from the point of view of protection of the environment and the economic viewpoint;
- comparison between studies and experience available on dismantling operations;
- establishment of certain guiding principles in the design and operation of nuclear installations with a view to facilitating their subsequent decommissioning;
- establishment of guiding principles in relation to decommissioning which could form the basis for a Community policy in this respect.

B. The elements of a Community strategy on the reprocessing of irradiated fuels

65. In adopting on 10 May 1976 the resolution tabled on behalf of our committe by Mr Noè (OJ No. C 125, 10 May 1976), the European Parliament pointed out that 'in view of the planned expansion in nuclear energy and the fact that according to present estimates, there will be a shortage of irradiated nuclear fuel reprocessing capacity in the early 1980's, the Community must contribute to the solution of this problem, taking advantage of existing technical and economic structures and those in the process of formation, and utilizing the ways and means provided for in the Euratom Treaty'.

66. The Commission of the Communities is now proposing to take the first action on the recommendation of the European Parliament by submitting to the Council a draft resolution establishing an ad hoc committee on the reprocessing of irradiated nuclear fuels.

67. After looking at the problem of reprocessing in the light of the Community's objectives (use of nuclear energy would provide the Community with energy supplies and reduce its dependence on outside sources,

the Commission deals in its communication with the problem of protection of the population and the environment. Its conclusions very largely coincid with those of your rapporteur, namely:

- that the radiological risks of reprocessing (for workers and surrounding population) can be confidently assessed on the basis of experience acquired, the doses observed hitherto being below the limits laid down by the health regulations of the member countries of the Community in accordance with the Euratom basic standards. (The problems of the radioactive waste produced by reprocessing are considered in the followin paragraph.)

Finally, and as the report has already pointed out, the risks run by future generations if there were no reprocessing would be increased by the presence of plutonium and the problems associated with its final storage.

68. In connection with safeguards against the misuse of nuclear materials and particularly plutonium, your rapporteur shares the conclusions of the Commission that the Member States and the Community have the powers (see Euratom Treaty) and the means to ensure effective control over the use of nuclear materials.

69. Analysing the present situation as regards reprocessing in the Community, the Commission reaches the same conclusions as our committee in the Noè report, namely a shortage of reprocessing capacity in future years as a result of the excessive delay in taking decisions to build. This delay is due to technological factors (reprocessing of highly irradiated oxide fuels from light-water reactors), financial factors (uncertain commercial profitability) and above all to the increasing opposition from public opinion. It is clear that the latter difficulty is by far the most serious and that the Member States and the Community must devote their efforts as a priority to this area.

70. This shortage of reprocessing capacity in future years (estimated at between 10 and 15,000 tonnes of fuel awaiting reprocessing) leads the Commission to put forward a strategy based on the coordinated development at minimum cost of the reprocessing industries, while ensuring that this technology is compatible with the requirements of safety and protection of the environment.

a) Promotion of reprocessing

71. The aims of the Community strategy for the development of reprocessin capacity should be as follows:

- to bring together the interests of the promoters and users in the Community and to combine their action with that of the Community itself,

while allowing for the possibility of third parties (and particularly its European neighbours) joining the group (S) formed;
- to open to users in all member countries, including those with a limited nuclear power programme, the possibility of acquiring the required reprocessing services under optimum economic conditions through participation in the groups formed; this would make it possible to limit the number of reprocessing plants in the Community to what is absolutely necessary;
- to foster mixed holdings with a view to encouraging the creation of efficient groupings;
- to provide certain financial aid (for example, participation by the Community, participation by third parties).

72. With this in mind the Commission recommends the use of the joint undertaking referred to in the Euratom Treaty, thus combining industrial initiative with the public service. In the case of the joint undertaking it will be remembered that the Euratom Treaty provides that both the Community and a third state, an international organization or a member of a third country can participate in its financing or its management.

73. It is clear, and your rapporteur would like to stress this, that the joint undertaking will only be successful insofar as the Member States and the industries concerned are aware that a strategy for reprocessing is only possible at European level and are prepared therefore to collaborate at this level. Another condition for the success of the joint undertaking is the definition at Community level of the objectives to be achieved in regard to reprocessing. It is with the aim of satisfying this condition that the Commission proposes to set up an ad hoc committee[1] to assist the institutions in drawing up the objectives and determining the means necessary for their implementation.

74. In the view of your rapporteur, one of the principal aims which would be helped by the establishment of joint undertakings and the ad hoc Committee is the creation of regional reprocessing centres (which could could also be developed into 'nuclear fuel centres'). Such centres could make a useful contribution, as proposed by the Commission, because of their limited number, to reducing the risk associated with the excessive spread of nuclear materials, particularly plutonium.

(b) Safety and the environment

75. To ensure that a Community strategy for nuclear reprocessing is compatible with the safety requirements, the Commission has announced its intention to put forward a research and development programme to keep the

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[1] composed of representatives of public bodies and the undertakings concerned

harmful effects of reprocessing within negligible proportions. Such a programme would fill a gap in Community research in the nuclear energy field. Similarly, the establishment of such a programme would help towards better coordination of the research at present undertaken in the Member States.

C. A Community plan of action on radioactive waste

76. In its first report on the problem of radioactive waste (submitted on behalf of our Committee by Mr Ballardini, Doc. 217/72), The European Parliament pointed out that 'those objectives can be secured only at Community level since here alone can a rational selection be made of storage areas, radioactive materials restricted to certain parts of the Member States' territory and reductions achieved in the cost of setting up and supervising the projected network'[1].

The Commission is now submitting the first Community plan of action, which to a large extent is giving effect to the recommendations adopted by the European Parliament through the Ballardini report.

77. In its explanatory memorandum the Commission points out that the Community institutions recognized some years ago the need for common action on the disposal of waste, particularly because

- the Member States are confronted with similar problems as a result of their nuclear programmes
- they all have a high population density
- all radioactive waste must be treated and stored so as to protect the population and the environment against radiological risks
- commercial aspects are of secondary importance and the management of radioactive waste must be the responsibility of a public body.
- Community action would avoid the pointless proliferation of waste storage sites and would make them easier to supervise while increasing safety.

78. Your rapporteur has already indicated that so far Community action on radioactive waste is limited to the field of research. The present proposal is to extend the area of Community intervention to the actual management of radioactive waste.

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[1]Resolution adopted 17.1.73, OJ No. C 4, 14.2.73

(a) Analysis of the Community plan

79. The draft resolution submitted to the Council is aimed at implementing a Community plan of action to ensure that the preparation of long-term solutions at Community level is organized in the best possible way. This plan would cover the period 1978/1990 with possibility of a review every three years. It is concentrated on 6 points:

- analysis of the basic situation in the Community with a view to the adoption in due course of the necessary solutions,
- measures designed to make it possible to create a Community network of storage sites,
- progressive harmonization and standardization of practices and policies in waste management,
- continuation of research and development efforts throughout the whole duration of the plan,
- study of the terms for financial participation by the Community in certain costs involved in the management and storage of waste,
- the provision of periodic information to the public at Community level.

80. To assist it in carrying out these actions the Commission proposes the establishment of a committee of senior government experts.

81. If one examines closely all the measures covered by these six guidelines one can only agree with the final objective which the Commission assigns to the Community in regard to radioactive waste. Unfortunately the means which have been announced are not appropriate.

Thus, an analysis of the content of the measures designed to enable a Community storage network to be established shows that these measures are limited to exchanges of technical information and to studies on the structure of a possible Community network of storage sites.

82. Making the management of final storage sites for waste a matter for the Community is certainly one of the most important problems at the present time. Your rapporteur believes and has attempted to demonstrate in this report that scientific and technical research is sufficiently advanced now to tackle the question of an international public body responsible for waste management. Even though the majority of the Member States are not yet ready to tackle the delicate problem of the level of responsibility for nuclear problems, the Commission, being aware of the vital importance of this question, should play its full part in providing a stimulus by submitting to the Council appropriate and more ambitious proposals.

83. This idea is reinforced when one is aware of what is involved in the proposal to provide periodic information to the public at Community level. Apart from studies of appropriate measures by the committee of experts, the

Commission proposes to publish in the Official Journal the results of the various analyses of the radioactive waste situation and possible solutions. Our committee, and subsequently the European Parliament, have stressed sufficiently the urgent need for Community action to inform public opinion about nuclear problems, for there to be no point in dwelling at too great a length on the inadequacy of the Commission's proposals.

(b) Breakdown and level of responsibility in the management of radioactive waste

84. Although there are clear differences in the legal forms of the nuclear industries in the various Member States, in each of them it is clear that the storage pf radioactive waste is a matter for the public authorities. At present the public authorities are those at national level. This situation has already caused problems and will do so even more in the future.

85. The two commercial reprocessing centres in operation in the Community process fuel supplied both by the power stations in their own country and by power stations from other Member States or third countries. However, the rule in force is that the waste resulting from the reprocessing of these fuels from other Member States may only be stored in the country of origin. Similarly, The Federal Republic of Germany has already adopted the principle that only waste of 'German' origin may be stored on its territory. This gives rise to abnormal situations which are not devoid of risks. What will happen when a Member State has its waste reprocessed by another Member State, and afterwards has to accept, apart from the uranium and the plutonium recovered, the radioactive waste for which it has no adequate storage sites? The same applies in the case of third countries, to whom very often the Member States have sold the nuclear technology but are unwilling to accept responsibility for the problem of waste.

86. Hence your rapporteur considers, along with the Commission, that the many problems associated with radioactive waste go beyond national level and can only be properly handled on a broader basis. Only in this way will it be possible to avoid the premature and isolated involvement of each Member State in expensive installations, the proliferation of radioactive waste dumps and a rise in the expenditure to be charged to the public authority which is to be established, etc.

87. One first stage in the internationalization of radioactive waste management would be to set up a Community network of waste storage sites under the responsibility of the Community[1].

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1 Such a network would fit in with the Community network of sites for nuclear power stations called for by the European Parliament (Walz report, Doc. 392/75)

(We have seen that the Commission envisages such action while limiting itself at the moment to preliminary studies). These storage sites would have organic links with the regional reprocessing centres in the Community

VI. CONCLUSIONS

88. The recent World Energy Conference (Istanbul 19-23 September 1977) emphasized the gravity of the problem of energy supplies in the forthcoming decades. When it indicated that, according to the most optimistic estimates, the energy needs in the world would have trebled by the year 2000, the conference set the level of the efforts which would have to be made.

89. For the Community these efforts necessarily involve the development of nuclear energy. Such a development means that the Community must equip itself with the necessary installations to cover the full nuclear fuel cycle, in particular, have adequate reprocessing capacity. This desire must be clearly expressed at Community level, not for the purpose of dissociating ourselves from one doctrine or another, but simply because such a policy is a vital necessity for Europe. In addition, there is the fact that certain Member States and the Community as such have opted for the breeder system and with this in view the necessary plutonium must be available.

90. The creation of a Community reprocessing capacity appropriate to our needs, and the promotion of breeder reactors must be placed within the framework of a Community strategy. The latter must comprise, in particular, the delegation to the Community of the powers necessary to ensure coordination of the efforts undertaken (both at research level and at industrial level), and powers of supervision over the use of nuclear fuels and observance of the international and EURATOM standards of safety and security.

91. Finally, the Community strategy in this area should have as its short term objective the creation within the Community of regional reprocessing centres under the dual responsibility of the Community and the Member States and thus forming the basis for real 'nuclear fuel centres'.

92. As regards the storage of radioactive waste, it must be emphasized first of all that this problem has not been 'ignored' by those responsible for energy policy. On the contrary, following the research programmes established in the 1960's, various solutions have been devised and tested. The Community has made its contribution to this policy by adopting research programmes in the form of direct and indirect actions. In continuing along this path, the Community must ensure that the research undertaken by the Member States in this sector is coordinated.

93. In the view of your rapporteur, in future the Community must do more than merely pay for a number of research programmes and must assume real

responsibility in regard to the management of radioactive waste. As a first step the Community must undertake harmonization of the safety and security standards for radioactive wastes and supervise their application.

94. Finally, and this constitutes a priority in the action to be undertaken at Community level, the problem of radioactive waste management must be taken above national level. We have seen that because of its complexity and its implications such a policy cannot be undertaken within a purely national framework. One first stage in the internationalization of waste management is the creation of a Community network of storage sites under the joint responsibility of the Member States and the Community.

95. The Committee on Energy and Research regrets that in its proposal the Commission limits Community action to studies and analyses of a possible Community network. The scope of the problem would justify a more ambitious attitude on the part of the Commission and therefore more constructive proposals. Because the Member States are refusing at present to adopt a position as to the level at which the question of radioactive waste should be treated and the associated transfers of powers, that is no reason for the Commission to back them up in the meantime.

96. Finally, the Committee on Energy and Research stresses the need to promote research programmes at Community level in connection with the dismantling of nuclear power stations. The first results acquired from the completion of these programmes should make it possible to define a Community strategy for dismantling. More immediately, a list of conditions to be observed should be drawn up for the construction of new power stations, which would make the dismantling of them easier in thirty years' time.

97. Subject to the comments made above, the Committee on Energy and Research notes its agreement to the proposals for decisions submitted to the Council relating to a Community plan of action on radioactive waste and a Community strategy on irradiated nuclear fuel reprocessing.