

# EUROPEAN UNION PROGRAMMES ON RADIOACTIVE WASTE MANAGEMENT AND DECOMMISSIONING

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In spite of its relatively small volume, radioactive waste has a very high political and media profile. Its management and, above all, its disposal are seen by many as an unsolved problem and by some as an insoluble one. While these people may question the future need for nuclear power one thing is certain, we will need to continue to safely manage radioactive wastes for many years to come.

This presentation is divided into four parts.

The first part covers the present situation on radioactive waste in the European Union (EU). It is based extensively on a report that we have prepared that was published in January 1999.

The second part deals with the Commission's proposal for a new Community Plan of Action in the field of radioactive waste management. This is something of a preview as it is unlikely that this will be approved before the autumn.

The third part deals with decommissioning in the European Union. Later speakers will deal with this subject in some detail, so this part is limited to a very brief overview of the situation.

There are concerns at many levels within the European Union about the safety of nuclear activities in a number of the countries that have applied to join the Union. The final part reports on how the Commission is addressing this challenge for radioactive wastes and decommissioning in the context of enlargement of the Union.

## **1. PRESENT SITUATION AND PROSPECTS FOR RADIOACTIVE WASTE MANAGEMENT IN THE EU**

Radioactive waste is generally understood as material without further use, which had been managed in a system of registering, licensing and control as specified in international, European Union or national legislation. The recent report by the Commission on the situation in the EU is mainly concerned with radioactive waste within the system of control. In addition, it looks at wastes from industrial processes involving concentration of natural radionuclides and residues from enrichment of uranium, both of which are not strictly considered as *radioactive* waste.

## 1.1. Radioactive waste streams

All Member States have radioactive waste arisings, even if quantities of waste needing long-term storage and disposal are very small in countries without nuclear energy-production capacity. Radioactive waste results mainly from four types of activity:

- nuclear electricity generation, including back-end nuclear fuel-cycle activities and decommissioning,
- the operation of research reactors,
- the use of radiation and radioactive material in medicine, agriculture, industry and research,
- the processing of material containing natural radionuclides.

The “Situation Report” provides arisings from the first three activities in five-year-periods up to year 2020. The figures only take into account only production from facilities which are already in operation, under construction, or firmly committed, and are probably close to the minimum quantity to be expected. The report distinguishes between low and intermediate level waste (non-heat generating) of short (up to 30 years) and long half-life; high-level waste includes vitrified residues from reprocessing and conditioned spent fuel declared as being radioactive waste. All quantities are understood as being valid for solidified waste, conditioned for disposal. Figures for quantities of un-treated waste have been adjusted in supposing an existing treatment process in order to assemble a coherent set of data.

For Member States without a nuclear power program, quantities needing storage and disposal are low: typically 0.5 m<sup>3</sup> per million of habitants is produced. This may rise to 10 m<sup>3</sup> per million inhabitants in countries operating research reactors.

Average nuclear power plants are dominantly light-water-reactors with about 1,000-MWe capacity. Typically, such plants produce about 100 m<sup>3</sup> annually of operation waste of the short-lived type (with arisings down to 50 m<sup>3</sup> for the most recent plants). Spent nuclear fuel discharged from such an average reactor amounts to 20 to 30 tonnes of heavy metal annually, depending on enrichment of the fuel and availability of the plant.

Decommissioning of an average nuclear power plant would result in the production of about 10,000 m<sup>3</sup> of radioactive waste, but as in most cases decommissioning is delayed for some decades, only a small percentage of waste from decommissioning is included in the figures of the report; greatly increase waste arisings from decommissioning may be expected for the period 2020 to 2050.

Annual production of conditioned radioactive waste is around 50,000 m<sup>3</sup>, somewhat less until 2000, and somewhat more afterwards. A decrease of arisings due to closure of old plants after year 2000 is compensated by increasing arisings from dismantling of nuclear installations. A comparison with what was expected when we produced the previous report shows a dramatic reduction. In 1992 we forecast of 80,000 m<sup>3</sup>/year for the Community. Not taking into account the arisings in Austria, Finland and Sweden which were not Member States at that time, the present expectations are less than 60% of the earlier ones.

The reasons for this reduction are: the construction of new power plants has been practically halted; a number of older plants have been definitively closed down; nuclear power plant operators have made tremendous efforts to reduce waste production at the source; and they have applied advanced volume reduction techniques.

For treating spent reactor fuel, reprocessing of fuel followed by vitrification of fission products is performed commercially in France and the United Kingdom. Three Member States, Finland, Spain and Sweden, have decided to condition all spent fuel for direct disposal, and others will prepare disposal of some types of spent fuel without reprocessing. For re-use of plutonium and, possibly, uranium from reprocessing, the production of mixed-oxide fuel and its use in light-water-reactors is fairly advanced. The option of using these fissile materials in fast-breeder-reactors is not now available.

## **1.2. Storage and disposal**

Storage of radioactive waste is a matter of routine. Some Member States are completing or have put in operation central storage facilities (“away-from-reactor”) for vitrified waste returning from reprocessing or spent fuel destined for direct disposal.

It has to be underlined that all Member States without a nuclear power production capacity have abandoned, for the time being, plans for disposal of their radioactive waste. Additionally, three countries with nuclear power production plants, Italy, the Netherlands and the United Kingdom, have decided to postpone disposal of high-level waste for periods ranging from at least fifty to more than one hundred years.

Disposal of radioactive waste has been performed by all Member States with a nuclear power plant programme. Until the end of 1994, a total of 1,665,000 m<sup>3</sup> had been finally disposed of by ocean disposal (till 1982), surface and shallow disposal, and by deep geological disposal. Finland, France, Spain, Sweden and the United Kingdom operate surface- and shallow-disposal facilities for radioactive waste containing only small quantities of long-lived radionuclides. Germany runs a deep disposal facility in a former salt mine (see Table 1). Long-lived heat-generating waste is stored on the surface until deep facilities become available (see Table 2). A

number of Member States are involved in preparatory work for disposal of this type of waste, in operating underground laboratories, seeking sites and preparing licensing.

### **1.3. Some other aspects of radioactive waste management**

In research and development, funding has decreased gradually during recent years. The main reason for this is that most processes involved have reached the stage of industrial use. The only element lacking is actual disposal of high-level heat-generating waste together with the definition and adoption of safety indicators for disposal over very long periods of time. A significant part of available funding is devoted to research on advanced separation of radionuclides and transmutation of long-lived ones.

All Member States with a nuclear power programme have set up agencies responsible for all or part of the management steps for radioactive waste. Control of the activities of these agencies is entrusted to safety authorities.

The report provides some information on costs of steps of radioactive waste management: disposal of non-heat-generating waste costs a few thousands of ECU/m<sup>3</sup>, but disposal of high-level waste will be very costly, as repositories for this type are expected to cost 2 to 4 billions Euro regardless of the quantity of waste to be disposed of. Financing of the back-end of the nuclear fuel cycle is done in different ways, mostly by earmarking part of the electricity price for this purpose.

All Member States of the Union have nuclear laws, regulations and standards on radiation protection and to some extent on control of radioactive waste management. European Union legislation is applicable in particular in the areas of safety standards in radiation protection, control of shipments of radioactive material, and on safeguards for fissile material which may be present in waste or spent fuel declared as being waste. Environmental impact assessments are required for radioactive waste disposal installations as laid down in Directive 85/337/EEC. An international Convention on the safety of spent fuel management and the safety of radioactive waste management was opened for signature and ratification by Governments in 1997.

### **1.4. Recommendations for Future actions**

Research and development should continue in radioactive waste management with the aim of improving data, models, and concepts related to long-term safety of disposal of long-lived (and particularly heat-generating) waste. Efforts on advanced partitioning and transmutation should continue, even if the chances are slim that this technique could eliminate the need for repositories in deep geological formations.

Member States of the EU are encouraged to continue their activities for siting, constructing and operating a repository for high-level waste in deep clay, granite or

salt formations. One of the main problems is the lack of acceptance by the public for any specific site in their neighbourhood. Better information may help to overcome this negative reaction, and the Commission intends to provide unbiased information to this end.

In supporting work by the radioactive waste management agencies to establish a safety case for a deep repository, the Commission became aware of difficulties in getting this accepted by the safety authorities. It is recommended to include to a large extent national safety authorities in preparatory work prior to requests for licensing of such repositories and to promote co-operation between the safety authorities of the Member States.

Large quantities of radioactive waste show very low levels of remaining radioactivity after they have been decontaminated or decay. During dismantling of nuclear installations, a large quantity of material may even be free of artificial radioactivity. Levels to clear this material exist, often on a case-by-case basis, at all nuclear installations. It is important to achieve, at Union level, a common set of rules for clearance (for unconditional and conditional clearance). The present situation, where some countries have clearance levels and others not, and where released material may circulate freely in the Common market, is not satisfactory.

Finally there is the important issue of self-sufficiency of the Union as a whole and solidarity between Member States in matters of radioactive waste disposal. As in its strategy for non-radioactive waste, the Union should aim for self-sufficiency, even if transfer to countries outside the Union is not excluded in Union legislation on control of shipment of radioactive waste. Some Member States have included self-sufficiency at national level in their legislation, barring entry of foreign waste for disposal. Countries with a large radioactive waste production certainly should be able to dispose of their waste on their own territory. The possibility of voluntary cooperation between Member States however should be kept open where e.g. a regional approach to disposal could result in increased safety and benefits to the environment.

### **1.5. The reaction of Member States**

The European Council – or, to be more accurate – the Atomic Questions Working Group of the Council, discussed the report during a series of meetings and prepared “Council Conclusions” on the subject. These are politically very important as they can endorse and encourage certain activities whilst criticising and even effectively stopping others. They give a very clear indication as to Member States priorities in the field. They can be seen as the basic elements of a Community policy on radioactive waste management.

The Council Conclusions on the Fourth Situation report were very positive. The duration and scope of the discussions themselves were clear indications of the importance Member States place on the topic of radioactive waste management.

Specifically the Conclusions:

- Encourage Member States to continue their efforts to reduce the quantities and activity of wastes arising from all nuclear applications;
- Encourage Member States to continue activities concerning geological disposal of radioactive waste and other options for its long-term management;
- Reaffirm the importance of the independence of regulatory authorities but also of an efficient, sustained and transparent exchange of information between operators and regulators on the development of disposal concepts and facilities;
- Insist on the need to further develop a common Community approach concerning the identification, classification, storage and eventual clearance of wastes with very low levels of radioactivity;
- Stress the need to develop common views to address the problems related to radioactive scrap metals and proper management of spent radioactive sealed sources;
- Stress the importance of ensuring transparency, at the level of governments, regulators, operators and the public, of waste management operations throughout the Community with the view to a better understanding of the technical, social, environmental and ethical issues involved.

## **2. THE ROLE OF THE EUROPEAN UNION**

### **2.1. The legal basis**

When the authors of the European Atomic Energy Community drafted the EURATOM Treaty, the thought of radioactive waste was not uppermost in their mind. Or, if it was, it only received an almost passing mention in the text. At that time (in 1957) the important thing was to accelerate the introduction of civilian nuclear power for the benefit of the citizens of the new Europe. The Treaty was there to help Member States to promote the use of this exciting new energy source which could - as at least one country had been known to say - produce electricity at a cost to make it too cheap to meter.

Nobody realised then that the waste they were generating would be seen by the next generation as a serious problem. The Euratom Treaty itself only contains one specific reference to radioactive waste management; this is in Article 37, which requires that “Each Member State shall provide the Commission with such general data relating to any plan for the disposal of radioactive waste in whatever form as will make it possible to determine whether the implementation of such a plan is liable to result in the radioactive contamination of the water, soil or airspace of another Member State”.

However, in November 1973 the Council approved the Community Environmental Programme which underlined the need for Community measures covering the “particular case of the handling and storage of radioactive waste” and specified the content of the procedures for implementing such measures. Many of the activities described - including drawing up of an inventory of wastes, comparisons of existing processes, examination of problems related to the transport of solidified highly active waste - still form an important part of the Commission’s activities in this area.

By a Council Decision (June 1975) a programme on the management and storage of radioactive waste was adopted as part of the Community’s research activities.

In 1980, the Council adopted a Resolution on the implementation of a Community plan of action in the field of radioactive waste. This Plan was for a period of twelve years. The Plan of Action was renewed in 1992 until 1999 (by Council Resolution of 15 June 1992).

## **2.2. A new Plan of Action**

The present Community Plan of Action for radioactive waste management expires at the end of 1999. The issue of radioactive waste has an even higher political profile than it did in 1980 when the first Plan was agreed by the Council. While there has been progress in many of the areas identified under the first Plan, much still needs to be done.

While the main objectives of the present Plan of Action remain valid in the future and its main elements should be retained in the renewed Plan, they need to be revised in the light of new priorities.

Therefore, the objectives of the proposed Plan of Action within the European Union are:

to encourage an effective protection of man and the environment against the dangers arising from ionizing radiation in the specific field of radioactive waste management and decommissioning of nuclear facilities;

to ensure, wherever possible, the continuation of the co-operation between Member States at the Community level in the field of radioactive waste management and

decommissioning of nuclear facilities with regard to the protection of the public and the environment;

to provide a better understanding and contribute to a wider dissemination of knowledge, leading to safer and more efficient management, including storage and disposal, of radioactive waste and decommissioning of nuclear facilities within the European Union;

to ensure access of the public to the necessary information concerning the situation in respect of radioactive waste management and the decommissioning of nuclear facilities to enable them to play their role in the decision making process.

However, the Plan also needs to take into account other new priorities. It needs to take into account the challenges posed by the planned enlargement of the Community which involves several states whose nuclear programmes were based on Soviet technology. A number of these States have Soviet designed nuclear power reactors and other nuclear fuel cycle facilities on their territory. Many of these states used to send their spent fuel and radioactive waste back to the Soviet Union, but this is no longer possible. They now have to build new facilities for the management of spent fuel and radioactive waste as these materials will now remain in their countries.

The next Plan of Action should therefore focus especially on the process of enlargement. Emphasis will continue and be increasingly placed on solving the problems caused by poor management practices, improving the safety culture and encouraging the use of better technology in the applicant countries of central and eastern Europe.

In particular, work should continue and be enhanced on assessment of the environmental and safety aspects of radioactive waste management policies, regulation and practices in applicant countries. And, on this basis, the Commission can advise and co-operate with them so that they can achieve and/or maintain the level of environmental protection and safety that is expected within the EU.

The topic of decommissioning nuclear installations has moved from being one of research into the technology to an activity of industrial maturity where issues are much more policy-related. The new Plan should also place greater emphasis on problems related to the decommissioning as the first decade of the next century will see a major increase in the number of nuclear facilities to be decommissioned. Therefore there is a need for a Community Strategy on decommissioning aiming at the development of a common approach in Member States and encouraging them to work towards the harmonisation of decommissioning strategies and practices wherever possible. This is also a politically important and sensitive issue in the context of the Applicant States.

### 3. DECOMMISSIONING OF NUCLEAR FACILITIES

Decommissioning is the final phase in the lifecycle of a nuclear installation and is to be considered part of a general strategy of environmental restoration after the final suspension of industrial activities. At present, over 110 nuclear facilities within the Union are at various stages of the decommissioning process and it is forecast that at least a further 160 facilities will need to be decommissioned over the next 20 years (with the present 15 Member States). Enlargement of the Union would contribute to a rapid increase in the number of nuclear facilities to be decommissioned (at least 50 facilities).

Since 1979, the European Commission has conducted four successive five-year research and development programmes on the decommissioning of nuclear installations, performed under cost sharing contracts with organisations from the European Union. The main objective of these programmes was, and is, to establish a scientific and technological basis for the safe, socially acceptable and economically affordable decommissioning of obsolete nuclear installations

After 20 years of EU research and development programmes on decommissioning, with the process having reached industrial maturity, the time is now ripe to review the environmental and regulatory related issues.

The decommissioning of nuclear facilities and the management of their waste involves environmental, technical, social and financial responsibilities. In some Member States it has not been clearly defined who will bear the responsibility for the decommissioning of nuclear installations up to the final stage. Until now decommissioning projects have often been regulated on a case-by-case basis and on the initial build-up of experience in this field. There is a marked difference between decommissioning strategies within individual Member States

The development of common views within the EU on the decommissioning of nuclear facilities should result in improved protection of the population and of the environment and in a more standardised technological approach resulting in, *inter alia*, a reduction in the volume of waste produced. Harmonisation of decommissioning practices in the Member States and the development of specific regulations covering decommissioning should make regulatory decisions easier, more efficient, transparent and more readily acceptable to the public.

At present, there are numerous gaps in the third party nuclear liability and environmental liability regime dealing with decommissioning. This is a particular problem in the light of the enlargement of the EU and the increased number of decommissioning operations foreseen for the near future.

Decommissioning costs represent around 50% of the discounted investments made for the nuclear part of a power plant. They must be fully taken into account in generating costs. Sound financial provisions for decommissioning should reduce the

potential burden on future generations. An environmental risk is to be feared if adequate financial provisions have not been built up to allow timely dismantling. This may be the case in some applicant countries.

Large volumes of material are produced during decommissioning activities and the environmental and financial costs of disposal of this material as waste can be very significant. Consequently, the minimisation of waste is important in the management of these projects.

Annex 1 of Council Directive 97/11/EC<sup>1</sup> of 3 March 1997 on the Environmental Impact Assessment describes the projects subject to the Directive. These include the dismantling and decommissioning of nuclear power reactors. However, while the general requirements are set out in the Directive, the detailed requirements could vary from State to State. Formally, the Directives set out the broad principles of the environmental assessment system. At first sight, the existing decommissioning plans, in most of the countries inside and outside the EU, focus only on radiological impact assessments rather than the wider Environmental Impact Assessment (EIA) covered by the Directive.

The final dismantling of a nuclear installation as part of a global environmental restoration strategy is of great concern to the public. They are worried about what will happen to the waste and about any potential lengthening of decommissioning time-scales. In addition, there is concern about leaving our waste to future generations. Even if the existing decommissioning regulations and procedures protect workers and the general public, they still need to be informed of the preventive measures taken. Decommissioning operations and the related strategy decisions should be undertaken with transparency, the involvement of the public and openness to their concerns.

The European Commission is in the process of preparing a Communication on decommissioning of nuclear installation in the European Union. This Communication addresses the issues surrounding the distribution of responsibilities connected with decommissioning; the management policy of materials and waste; radiation protection; the impact on the environment; public perception; the technical approach and the financial aspects.

The Communication will set out proposed guidelines for decommissioning policies and strategies in the European Union. We believe that the Applicant States should also use these guidelines. The Communication will also describes a number of activities to be undertaken at Community level.

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<sup>1</sup> Council Directive 97/11/EC of 3 March 97. Official Journal N° L 73/5 of 14/3/97

#### **4. THE CHALLENGES OF COMMUNITY ENLARGEMENT**

In the context of enlargement, nuclear safety is both a difficult and a very sensitive issue.

There are many concerns about the safety of nuclear installations (nuclear power plants and other nuclear facilities) in the applicant States. It is believed that some of these installations would not be licenced by EU regulatory authorities.

While much of the concern has focused on the RBMK reactors at Ignalina in Lithuania and on certain other Russian designed VVR reactors at Kozludy ((Bulgaria) and Bohunice (Slovak Republic), there are also concerns about the safety of other nuclear power plants and other facilities, including those for management of all the radioactive wastes.

Member States want the safety of these installations to be assessed and this assessment taken into account during the enlargement negotiations. In its Conclusions of 7 December 1998, the Council asked the Commission to “ensure that a high level of nuclear safety continues to be given priority in the Accession Partnership process” and to try to “ensure that the technological and operational safety levels are aligned with the current prevailing safety practices in the Union”.

Unfortunately, while it is regarded as a very important issue by both governments and the public at large, the Community acquis (body of legislation) in this area is limited to a very specific field, namely radiation protection. This in itself is insufficient for a full assessment of the safety of nuclear facilities and practices in the applicant States.

While the most logical solution, from the point of view of the Union, would be to establish Community standards by which the programmes of the applicant States could be measured, this would be politically impossible in the time available.

Nuclear safety is the responsibility of States themselves. Many Member States would be extremely reluctant to agree to additional Community competencies – Community-level rules and regulations - in this area. Therefore, the necessary assessments must be made and progress monitored without being able to refer to any specific “Community standards”.

Realising the problem, the Council, in its Conclusions, emphasised the “need to develop further methods relevant to the realisation of the objective of a high level of nuclear safety”. In response, the Commission is developing a method that could be used to assess those aspects of nuclear safety in the applicant States that are not covered by the Community acquis.

## **4.1. What are the challenges?**

The challenges are:

### **4.1.1. *Environmental***

The current situation in the nuclear safety area differs between CEECs. In some applicant States there are reactors that give rise to concern about risks of accidents with radiological fall-out. Others have no power plants but have research reactors of “institutional” radioactive wastes. Radioactive waste management is at different levels in the different States and a number of facilities for processing, storage or disposal would not be licensed in the EU. Some applicant States have severely contaminated sites (i.a. from mining and at former military sites). In many applicant States there is still a great need to improve the necessary infrastructure.

Most – if not all - accession countries have major radiation protection problems; Existing radiation protection legislation is often very partially transposed and poorly enforced. Radiation protection administrations are often weak and understaffed. The radiation protection authorities are faced with high demands on specialised technical support and with scarce financial and human resources. Licensing procedures, dosimetry laboratories, advisory technical committees, technical expertise on environmental radioactivity and an inspectorate must be in place to support an independent radiation protection authority.

### **4.1.2. *Political***

Political challenges are mainly linked to the safety of nuclear installations, especially, but not exclusively, nuclear power reactors. There is public concern in the Union about the possibility of applicant States joining the Union with unsafe installations still in operation. It should be realised that once these countries have joined the Union, to impose, for example, the shut-down of facilities by normal Community legal means is impossible.

### **4.1.3. *Economic and financial***

Approximation of radiation protection and connected legislation and establishing the necessary infrastructure will be a resource-demanding process in most of the CEECs. Even larger resources might, moreover, have to be set aside for restoration of some heavily contaminated sites, to continue to upgrade nuclear power reactors where desirable and to start decommissioning activities for power reactors that will be shut down.

Nuclear safety can be threatened by adoption of the internal market rules. Countries are more competitive if their supplies of energy are cheaper than their neighbours. They can also market their energy (in this case electricity) in an open market. One way of reducing costs of nuclear generated electricity is to reduce the levels of safety

built into the system or not make the necessary provisions for decommissioning and waste management.

Some States might be able to generate the necessary resources through “ordinary” financial instruments, but others – probably for many years - will need special financial support (=under other than market rules) to implement necessary safety measures, taking into account the lack of investment capital in the countries concerned. In the longer term, decommissioning costs and all other costs related to the management of radioactive waste from nuclear power stations should be covered by electricity prices.

#### **4.2. What are the Community objectives?**

- To close those facilities – in particular nuclear power plants but also waste management and other nuclear facilities - that cannot be economically upgraded in line with similar facilities in the EU.
- To upgrade those other facilities to a level at which they could be licensed in a Member State.
- To raise the level of operational standards and practices in the applicant States before accession to be in line with those in the present EU.
- In general, to establish a high level of nuclear safety in those applicant States, equivalent to that in the present European Union.
- To ensure and promote compliance with the nuclear safety acquis in the CEECs.
- To promote harmonisation of safety principles and practices in the whole area of nuclear safety.
- To strengthen the role and capacity of national regulatory bodies and to promote transparency and openness in relation to the public in CEECs
- To try to ensure that the accession States make the necessary financial provisions to cover the costs of safe electricity production, including decommissioning and radioactive waste management. This might best be done through energy, in particular electricity prices.

#### **4.3. What are the means? - A “two-pronged” approach**

For the purpose of this discussion, nuclear safety can be divided into two areas. One area is covered by the Community acquis and one is not covered by the Community acquis. In very general terms, the former includes radiation protection, transport of radioactive materials and trans-boundary shipments of radioactive materials. Not

covered by the acquis are the regulation and safe operation of all nuclear installations (such as nuclear power plants, spent fuel and waste management facilities, including those for storage and disposal) and aspects of the decommissioning of such installations.

#### **4.3.1. *Area covered by the Community acquis***

The Community acquis in this area is mainly based on Chapter III of the Euratom Treaty and on the derived legislation (25 different pieces of legislation including 19 legally binding pieces). Most important are the framework directive setting Basic Safety Standards, legislation applicable to radiological emergencies and legislation on shipment of radioactive waste and radioactive substances.

The means to achieve the objectives in this area are through training actions (both legal and technical training); technical assistance through the PHARE programme (Off-Site Emergency Planning OSEP subprogramme); and involvement of Accession countries in the Community arrangements and programmes.

#### **Specific measures**

The reinforcement of the institutional and administrative capacity of Accession Countries will be achieved through the following measures:

- the creation of a network of European competent authorities in radiation protection;
- the development of a substantial legal and technical training programme not only covering civil servants and regulators but also radiation protection professionals.
- the promotion of a radiation protection culture. Financial assistance will be given to the collaboration among radiation protection societies throughout Europe to promote knowledge of radiation protection.
- the participation of accession countries in Commission actions: Extension of the European Community Urgent Information Exchange (ECURIE) system to the Accession Countries.

#### **4.3.2. *Area not covered by the Community acquis***

There are a number of ways in which the Community can address the challenges posed by nuclear safety in the applicant States outside of the area covered by the Community acquis. Most of these “means” have been in use for some time, though greater efforts will now be required.

**Monitoring and reporting:** Assessments need to be made of the safety of nuclear installations and practices. These would need to be made at regular intervals to monitor progress. Information would be input into negotiations.

**Participation:** Greater involvement of national nuclear regulators and other relevant authorities from applicant States and, where appropriate, operators in the technical working groups and meetings of the Commission. Representatives from the applicant States are already members of a number of standing groups on nuclear safety and technical working groups on radioactive waste management and decommissioning.

**Support to regulators:** Enhanced support to further develop strong, independent national regulators in the nuclear sector. Support to nuclear regulators in applicant States is already being funded by activities of DG XI and that part of the Community's PHARE nuclear safety programme managed by DG XI.

**Co-operation:** Enhanced co-operation on those facilities that may not presently meet Western standards. For example a small number of studies (financed by PHARE and DG XI) are under way on facilities for radioactive waste management in applicant countries. These should identify the short comings of the facilities, recommend ways in which these could be re-addressed and, possibly, co-operate in the necessary work to upgrade the facilities. There are also studies on the decommissioning of nuclear installations in these countries.

**Technical assistance:** Encourage and co-ordinate assistance to either improve those facilities that can be upgraded to be in line with those operating inside the Union or to help with their closure if they cannot be upgraded. There will be need for more technical assistance in the period up to accession. Some will be provided through PHARE. However, it should be pointed out that a source, or sources, for the very large amounts of funding that will be required has yet to be identified. This should be a priority task in the months ahead.

#### **4.4. Co-operation with the CEECs**

The PHARE programme has been already been active in the area of radioactive waste management. It has supported a number of studies, probably the most important being the *detailed regional study of management schemes for the backend of the nuclear fuel cycle, radioactive waste management and decommissioning of obsolete installations* by the CASSIOPEE grouping. This covered Bulgaria, the Czech Republic, Hungary, Lithuania, Poland, the Slovak Republic and Romania. The results of this major study will be described later in the meeting. In addition, the PHARE regional programme outside of the nuclear safety budget addressed the problem of uranium mill tailings.

Until 1997, with the exception of a small contract looking at the situation of at-reactor spent fuel storage in the CIS and the CEECs, DG XI did not undertake any

projects in the PHARE area. This was mainly a reflection of the fact that, in our view, the problems of radioactive waste were greater in the NIS than in the CEECs.

The situation changed in 1997, mainly because of the planned enlargement of the Community. It is now expected that countries covered by the PHARE programme will, over the next few years, join the Union. In this case they will no longer be treated as third countries benefiting from technical assistance programmes, but integral members of the Community. As such, their contacts with the Commission on all aspects of nuclear safety and radioactive waste management will be with DG XI.

In 1997 we launched two CEECO studies to provide us with a general overview of existing and future requirements for decommissioning nuclear facilities in the Slovak republic and the Czech Republic and in Hungary, Poland and Slovenia. The results of this study were reviewed with representatives of the Applicant States at a meeting in Mol, Belgium earlier this month (June 1999). Another study launched in 1997 was on the management of nuclear spent fuel from the Polish research reactor.

In 1998 we launched an important new initiative in a number of the Applicant States. This was a study on the management of spent sealed sources in the Czech Republic, Hungary, Slovenia, Poland and Estonia. The work started at the beginning of this year and should be completed by mid-2000. A companion study will soon be launched covering Latvia, Lithuania, Bulgaria, Slovakia and Romania.

Also in 1998 we launched a study of the management routes for radioactive waste arising from the decommissioning of the sarcophagi at Paldiski in Estonia. This study also started earlier this year and will be completed in mid-2000. We also launched two smaller studies at Magurele in Romania. One was a preliminary evaluation of spent fuel storage at the research reactor. The other concerned identification of short term improvements in the waste treatment plant.

In addition, we extended two “internal EU” studies, one on the role of Environmental Impact Assessments (EIAs) in siting of geological repositories and one on Financing Schemes for radioactive waste management – to cover CEECs. The results of the studies and their extensions were presented and reviewed at two seminars attended by representatives of the 25 countries covered in Brussels in April 1999.

This year the programme will continue to put emphasis on problems related to existing spent fuel and radioactive waste storage facilities and possibly some follow-up to earlier PHARE studies on the management of spent fuel from research reactors. It is also expected to contribute to the remediation of a mill tailing site in Poland.

The main objectives of DG XI work with these countries are:

- to make sure that our environment awareness and safety culture has been transferred before enlargement takes place.

- to make sure that all the necessary infrastructure and institutions are in place to achieve and maintain the level of environmental protection and safety that is expected of all our Members States; and
- to build up all the necessary contacts that will be required in the future.

#### **4.5. Conclusions**

We can help to better define problems in the CEECs. We can help to identify solutions. We can, in many instances, provide the necessary technologies to put the solution into effect. We can sometimes help in arranging the necessary financing. We can transfer our environment awareness and safety culture - for the benefit of us all.

What we cannot do is pay for all the work that needs to be done. Our financial resources are very limited. The money we can spend will never cover more than a very small part of what will need to be spent to remediate the contaminated areas or to raise the level of safety to that which we can all be happy with.

We cannot impose our own environment awareness and safety culture. We can only make it available. The “beneficiary” must want to adopt it. We can only help those who want to help themselves.

The bottom line is “co-operation”, “co-operation” and then “co-operation”.

**TABLE 1****Situation regarding existing repositories**

<b>Country</b>	<b>Facility/site and year of start of operations</b>	<b>Capacity (m<sup>3</sup>)</b>	<b>Capacity used by end 1994 (m<sup>3</sup>)</b>	<b>Approx. rate of filling 1995-99 (m<sup>3</sup>/y)</b>
Finland	VLJ-repository (1992) LOSI-repository (1998)	8,500 5,600	1,700 -	}300 }
France	Centre de la Manche ('69) Centre de l'Aube (1992)	500,000 1,000,000	~full 100,000	- 17,200
Germany	Morsleben (restarted '94)  Konrad (not yet opened)	40,000  up to 650,000	15,864  -	} }7,560 } }
Spain	El Cabril (1992)	35,000	2,900	2,100
Sweden	SFR (1988) OKG (1990) Ringhals (1993) Forsmark (1988) Studsvik (1988)	60,000 9,000 10,000 10,000 1,625	15,482 2,462 2,000 2,205 325	} } }1,100 } }
United Kingdom	Drigg (started ?) Dounreay (started ?)	1,400,000 30,000	880,000 15,000	}11,600 }

Note:

Rate of filling is calculated using the predicted arisings during the stated period (LILW-surf except for Germany, for which LILW-deep is considered) - no account is made of waste to or from interim storage, which could decrease or increase the filling rates of the above final repositories.

**TABLE 2****Quantities of High Level Waste/Spent Fuel Destined for Direct Disposal  
in EU Members States**

Country <sup>2</sup>	High Level Waste (in m <sup>3</sup> )		Spent Fuel (in tU)	
	Interim storage At end 1994	Estimated Arisings Period 1995-9	Interim Storage At end 1994	Estimated Arisings Period 1995-9
Belgium	195	40 <sup>3</sup>	None	none <sup>4</sup>
Denmark	~ 0.03	None	None	none
Finland	None	None	800	647,5
France	1,500	700 <sup>5</sup>	None	none
Germany	See footnote <sup>6</sup>	264 <sup>7</sup>	See footnote <sup>8</sup>	1,900
Italy	18	None	330	none
Netherlands	None	None	None	none
Spain	None	None	1,650	790
Sweden	None	None	3,000	1,060
UK	650	350	None	none

Those countries that reprocess their spent fuel report high level waste arisings (vitrified waste from the reprocessing operations) in cubic metres. The annual arisings are around 250 cubic metres.

Those countries that dispose of the spent fuel directly give the quantities in terms of tonnes of heavy metal (or tonnes of uranium) contained in spent fuel elements. The annual arisings are around 800 tonnes.

<sup>2</sup> Austria, Denmark, Greece, Ireland, Luxembourg and Portugal have no arisings ; spent fuel from research reactors is returned to supplier.

<sup>3</sup> Figures are based on reprocessing, but this is no longer the reference solution for spent fuel.

<sup>4</sup> See footnote 2.

<sup>5</sup> m<sup>3</sup> of glass.

<sup>6</sup> 1,620 m<sup>3</sup> in total, without distinction between High-Level Waste and Spent Fuel.

<sup>7</sup> Only vitrified wastes returned from France and UK after reprocessing of approx. 2,200 tU.

<sup>8</sup> See footnote 5.