COMMISSION OF THE EUROPEAN COMMUNITIES

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PROPOSALS FOR COUNCIL DECISIONS

CONCERNING THE SPECIFIC PROGRAMMES IMPLEMENTING THE

EUROPEAN COMMUNITY FRAMEWORK

PROGRAMME FOR

COMMUNITY RESEARCH AND TRAINING ACTIVITIES FOR THE

EUROPEAN ATOMIC ENERGY (1994-1998)

(submitted by the Commission)

EXPLANATORY MEMORANDUM

This document is being submitted in order to present the proposals for Council Decisions concerning the specific programmes implementing the 1994-98 framework programme. The proposals are based on the scientific and technical content of the specific programmes set out in the Commission working document COM(93)459 final of 6 October 1993. They also take account of the constructive comments made concerning the working document and new factors emerging during the decision-making process in relation to the framework programme.

In drawing up the specific programmes, account was also taken of the guidelines set out in the White Paper on growth, competitiveness and employment (COM(93)700 final of 5 December 1993).

For reasons of consistency and transparency, the proposals are being submitted in a single document containing all the proposed specific programmes under the framework programme as set out in the table of contents. However, this does not rule out the possibility of each proposal being discussed separately.

Another document is also being submitted concerning the proposals for Council Decisions concerning the specific programmes implementing the fourth European Community framework programme for Community research, technological development and demonstration activities (1994-98).

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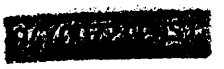
Proposal for a

COUNCIL DECISION



adopting a specific research and

training programme in

the field of nuclear safety and safeguards

(1994-1998)

PROPOSAL FOR A COUNCIL DECISION
of .....

adopting a specific programme of research and training in the field of nuclear safety and safeguards

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular Article 7 thereof,

Having regard to the proposal from the Commission,[1] presented following consultation with the Scientific and Technical Committee,

Having regard to the opinion of the European Parliament,[2]

Having regard to the opinion of the Economic and Social Committee,[3]

Whereas, by Decision ../../Euratom[4], the Council adopted a framework programme of Community actions in the field of research and training for the period 1994-98 specifying inter alia the activities to be carried out in the field of nuclear safety and safeguards; whereas the present Decision must be taken, where appropriate, in the light of the grounds set out in the preamble to that Decision;

Whereas Article 2 of Decision ../../Euratom specifies that in the case of activities covered by the Euratom Treaty the framework programme is to be implemented through specific programmes adopted in accordance with Article 7 of the Treaty and that each specific programme is to define the detailed rules for implementing it, fix its duration and provide for the resources deemed necessary;

Whereas this programme will be carried out mainly through shared-cost actions and concerted actions;

Whereas the content of the framework programme of Community actions in the field of research and training was established in accordance with the principle of subsidiarity; whereas this specific programme sets out the content of the activities to be carried out in accordance with this principle in the field of nuclear safety and safeguards;

Whereas, as is laid down in Annex III to Decision ../../Euratom, the Community needs a "nuclear safety and safeguards" programme with the objective of arriving at a better understanding of nuclear safety and safeguards and of stimulating broad collaboration between the Member States in this field;

Whereas basic research in the field of nuclear safety and safeguards must be encouraged so as to enable innovative concepts to be developed;

Whereas this programme and its implementation will help to strengthen synergies between the Community's research and training activities and those carried out in the field of nuclear safety and safeguards by research centres, universities and businesses, including small and medium-sized enterprises, in the Member States;

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1 OJ No ..., ..., p.
2 OJ No ..., ..., p.
3 OJ No ..., ..., p.
4 OJ No ..., ..., p.

Whereas the abovementioned Decision provides that the primary objectives of the Community's research actions must be to strengthen the scientific and technological base of European Community industry and to make it more competitive at international level, while maintaining the highest safety standards possible;

Whereas, in the implementation of this programme (for 1994-98), international cooperation with other third countries and international organizations, in accordance with Article 101 of the Euratom Treaty, might also prove useful;

Whereas the implementation of this programme also comprises activities developed within the programme for the dissemination and valorization of research results as well as activities for promoting the mobility and training of researchers, to the extent necessary for its proper execution;

Whereas on the one hand, progress with this programme should be permanently and systematically monitored with a view to adapting it, where appropriate, to scientific and technological developments in this area; whereas on the other hand, there should in due course be an independent evaluation of progress with the programme so as to provide all the background information needed in order to determine the objectives of the fifth framework programme of research and training for the European Atomic Energy Community; whereas at the end of this programme there should be a final evaluation of the results obtained compared with the objectives set out in this Decision;

Whereas the JRC may participate in the indirect actions covered by this programme;

Whereas the JRC will also contribute, through its own programme of direct actions, to the attainment of the Community research and training objectives in the areas covered by this programme,

HAS ADOPTED THIS DECISION:

Article 1

A specific programme of research and training for the European Atomic Energy Community in the field of nuclear safety and safeguards, as set out in Annex I, is hereby adopted for the period from (date of adoption of this programme) to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 160 million, including 17.2 % for staff and administrative expenditure.

2. An indicative breakdown of this amount is given in Annex II.

3. The above-mentioned amount deemed necessary for carrying out the programme may be increased in consequence and in accordance with the decision mentioned in Article 1, paragraph 3 of Decision ../.. Euratom (Framework programme 1994-1998)

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the scientific and technological priorities set in the framework programme of Community actions in the field of research and training for the European Atomic Energy Community (1994-1998).

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex I, Chapter 3 and in Annex III.

Article 4

1. The Commission shall permanently and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still in keeping with the evolution of the situation. Where appropriate, it shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. At the end of this programme, the Commission shall instruct independent experts to conduct a final evaluation of the results achieved compared with the objectives set out in Annex III to the framework programme of research and training (1994-98) and Annex I to this Decision. The final evaluation report shall be forwarded to the Council, the European Parliament and the Economic and Social Committee.

Article 5

1. The Commission shall be responsible for the implementation of the programme.

2. The Commission shall be assisted in the implementation of the programme by the Consultative Committee for the Nuclear Safety and Safeguards Programme set up by the Council Decision of .....

Article 6

The Commission is authorized to negotiate, in accordance with the second paragraph of Article 101 of the Euratom Treaty, international agreements with European third countries and with international organizations established in Europe with a view to involving them in all or part of the programme.

Article 7

This Decision is addressed to the Member States.

Done at Brussels, ...

For the Council
The President

(2)

ANNEX I

OBJECTIVES AND SCIENTIFIC AND TECHNOLOGICAL CONTENT

The present specific programme reflects the orientations of the framework programme for the European Atomic Energy Community, applies its selection criteria and defines its scientific and technological objectives.

The first paragraph of Annex III of the framework programme is an integral part of the present specific programme.

1. THE CONTEXT

Although nuclear energy has reached considerable maturity in the Community and elsewhere in the western world - the safety record of its nuclear plants is excellent - it is not universally accepted by our society. The Community action therefore aims at stimulating collaboration with the objective to improve the knowledge in specific areas and to develop a new global and dynamic approach to nuclear safety in the broadest sense. The joint setting of priorities should bring all interested parties closer in a better understanding that nuclear energy, like other mature technologies, can benefit from further development. New technological solutions may be found to solve problems which today make nuclear energy unacceptable to some. Of course, it must be understood that new technology will not necessarily be applied simply because it exists, just as we cannot afford to make a definite judgement about its use by future generations on the basis of today's knowledge.

In that sense, a global dynamic approach means that there must be an improvement of the understanding and quantification of the overall risk associated with the use of nuclear energy: considering the whole cycle, considering all exposure to ionizing radiation, not only from nuclear but also from medical and other applications as well as from natural radioactivity; considering normal and accidental conditions; considering the historical liabilities associated with its use elsewhere - e.g. the Commonwealth of Independent States (CIS)-; and considering the possibility of technological evolution just as in other high-technology areas.

To support that approach, the various activities are set out and managed accordingly in one single programme. Consequently, they are deliberately not grouped as a set of individual actions (as in the previous Framework Programme), although they are assembled according to the main emphasis of the respective activity as related to the use of nuclear energy in the global sense. The technical maturity reached in some areas of the nuclear cycle implies a re-orientation of priorities, concentrating on aspects dealing with exposure of man and environmental impacts. A number of concerted actions will be launched to safeguard adequate exchange of information and data collection.
As indicated in the defferent activities proposed, the JRC is closely associated with them[1].

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[1] A more detailed description of the JRC's research activities, which are defined in a proposal for a separate Council decision, is given in Annex IV for information in order to ensure the transparency in relation to their complementarity with corresponding indirect actions.

2. PROPOSED ACTIVITIES

Exploring new concepts

The proposed activities will illustrate a new approach which aims at exploring ways to improve the acceptance of nuclear energy through an integrated initiative addressing the three main issues of common concern:

- reactor safety, especially with regard to severe accidents
- the management of long-lived radionuclides (including plutonium)
- the risk of fissile material diversion.

These activities will be carried out in close cooperation with authorities, industry and the scientific community.

It is proposed to pursue two main lines of approach: on the one hand, alternative approaches to the safety design of reactors and to fuel cycles will be considered with a view to identifying and investigating promising design-related solutions; on the other hand, the potential of alternative waste management options based inter alia on partitioning and transmutation (P&T) will be explored.

2.1. Conceptual safety features

Besides a continuous improvement of the safety of reactors which takes account of the experience from operating plants and new results from research, industry is examining new safety concepts, in particular so-called passive or inherently safe systems which could be implemented in future reactors. Prospective theoretical and some experimental investigations are foreseen to assess these concepts with regard to their feasibility and their benefit to overall safety. These investigations will be of generic nature and not refer to specific reactor concepts. The results should provide supporting data for the choice of those features that reply best to future development trends in the Community and worldwide.

Approaches to reduce the amount of long-lived radioactivity in spent fuel by changing the composition of the fissile material could be included in an overall analysis of the fuel cycle which could also cover the aspect of safeguards.

The investigation of advanced fuel cycle strategies will require some experimental research which will be performed in concertation with the JRC.

2.2. Partitioning and transmutation

Methods to reduce the long-lived (half-life > 30 years) nuclide inventory of nuclear waste should be investigated, although the final disposal of nuclear waste in deep repositories cannot be avoided. On the basis of present technology, this objective might be achieved by highly separative reprocessing of irradiated fuel (partitioning) and repeated irradiation of waste isotopes in specially adapted fast reactors or other irradiation facilities (transmutation). The feasibility and potential benefit in terms of cost, health, safety and environmental impact of P&T schemes should continue to be assessed, while the first technical developments are launched.

Some work in this area will be pursued in concertation with the JRC.

Reactor Safety

Since it is of vital importance to improve the understanding of severe accidents in order to prevent possible radioactivity release under severe accident conditions, severe accident phenomena and mechanisms will be the main items of research.

Furthermore, different measures to mitigate the consequences of a severe accident will be studied.

2.3. Severe accidents

Investigations of the various phenomena involved e.g. core degradation and the release and behaviour of fission products will be carried out. The results of the experimental PHEBUS Fission Product project, previously organized jointly by CEA-Cadarache and JRC Ispra, will provide essential data in this respect. Molten fuel-coolant interaction and molten core-concrete interaction as well as hydrogen generation and combustion are the main concerns with regard to the primary system and containment integrity.

In connection with interactions between the molten fuel and its environment, the JRC Ispra FARO facility will continue to provide experimental results.

Besides the study of accident progression mechanisms, major attention will be devoted to the integrity of the containment system and the material characterization of the various safety-relevant components under severe accident conditions in order to evaluate the safety margins.

The proposed activities include theoretical and experimental investigations, code developments and validation as well as benchmark exercises. The joint use of existing and, possibly, new large test facilities is foreseen.

Closing the nuclear fuel cycle

One of the main objectives of this activity is to contribute to a further integration of the efforts undertaken by the Community and the Member States to develop the technical basis for a common understanding of the scientific issues of the disposal of long-lived radioactive waste, specifically spent fuel and vitrified High Level Waste (HLW). The strategic issues involved are the time horizon to be considered for the analysis of disposal concepts, the possibility of retrievability of waste and the safeguarding of spent fuel.

Even Member States not having a nuclear programme may need to dispose of radioactive waste e.g from research reactors.

2.4. Safety aspects of geological disposal

The Community's analysis of the long-term safety of disposing of HLW, the PAGIS (Performance Assessment of Geological Isolation Systems) study, concluded that - assuming predictable natural evolution - geological disposal can assure adequate protection even tens of thousands of years after the emplacement of the waste if appropriate sites are selected. There are basic questions, however, on which a consensus should be reached at European level at least, e.g.:

- Predictions about the evolution of the environment and the activities of mankind in the vicinity of a repository become less accurate, the more they are projected into the future. This should be reflected in an agreed *long-term time horizon* up to which the safety analysis of disposal concepts has to be elaborated.

- The *possibility of retrieval* of the disposed material and its consequences on safety should be evaluated together with its costs and limitations to determine whether its benefits outweigh those of the present concept of permanently sealed, inaccessible repositories, from which recovery of waste is difficult.

- *Accidental intrusion* which implies a wide field of scenarios. A common approach to this problem would be desirable with a view to providing safeguards and ways to assure their effectiveness for longer periods.

A common position on these issues would present an essential element for a European safety philosophy on disposal of radioactive waste.

The Community's Plan of Action in the Field of Radioactive Waste should play an important role in reaching agreement on these questions between the Member States and stimulate their participation in the relevant investigations.

2.5. Underground laboratories for waste disposal

Underground laboratories are a necessary prerequisite for meaningful research on crucial phenomena related to geological disposal. As in the previous programmes tests and investigations on geological disposal in the underground laboratories in Asse (Germany) and Mol (Belgium) should be continued. Possible new laboratories could also become part of the Community programme. These facilities should offer important opportunities for participation from all EC countries for performing research projects under representative conditions. The projects shall provide qualitative and quantitative elements for characterizing possible disposal sites, for designing optimized repository concepts and for evaluating the long-term protective performance of disposal strategies.

Research on geological and engineered barriers, development of special mining and waste emplacement techniques and radiological investigations should be carried out in the underground laboratories and in associated research facilities, thus contributing also to demonstrate the feasibility and safety of underground repositories.

2.6. Supporting research

The assessments of waste disposal schemes will require further analysis and modelling of the performance of natural and engineered barriers, transfer of radioactivity from the waste packages in the repository through the geosphere into the biosphere as well as the verification and validation of long-term predictive assessment models of the geological environment of repositories. Useful information on the evolution of disposal systems is also gained from natural analogue and geoprospective studies.

Development of effectively controlled advanced waste volume minimization is envisaged with a view to introducing safe and effective standard practices.

Another object of R&D is the provision of scientific data to support EC policies in the field of nuclear safety standards, and of reliable methods to implement such policies.

Actions to enhance the safety culture of nuclear energy and confidence in safety should include the technical application of radiological optimization principles and the further development of Quality Assurance methodology in conjunction with the EC "Network of Testing Facilities".

Radiological impact on man and the environment

The Euratom Treaty defines the Community responsibility for "establishing uniform safety standards to protect the health of workers and the general public and ensure that they are applied" and for "studying the harmful effects of radiation on living

organisms". Although the present radiation protection standards and the underlying scientific information are of high quality, it remains imperative to reduce the remaining uncertainties in the quantification of radiation risks arising from the use of ionising radiation in energy production, industry and medicine, as well as from exposure to natural radiation. This concerns all phases of the nuclear cycle where (potential) exposure situations may exist and also considers the consequences of nuclear accidents, the limitation of the extent of possible health effects, the mitigation of environmental consequences and the development of methods for the management of nuclear emergencies. The range of issues concerned and the many underlying scientific disciplines require a truly inter-disciplinary approach to radiation protection research and the intensive involvement of university based research.

The priorities set forward here are closely linked with the validation work proposed in the area of historic liabilities which mainly deals with the health and environmental consequences of the Chernobyl and other radiation accidents and of past uncontrolled releases of radioactive materials in the Commonwealth of Independent States.

2.7. Understanding the mechanisms of radiation action

The mechanisms of radiation action need to be known in order to be able to extrapolate the radiation effects determined experimentally to predict, with confidence, the effects at low doses. Continuation of the studies of radiation induced hereditary effects and effects after in-utero irradiations will contribute to a deeper understanding of the mechanisms at the cell level. This understanding will be gained by mobilizing the most up-to-date techniques from molecular and cellular biology, by studying mutation and chromosomal aberration formation and the role of DNA repair and by combining this work with recent developments in radiation energy deposition modelling to elucidate a comprehensive biophysical model of cellular radiation action. The extension of this understanding to the radiation induced cancer process will take advantage of new knowledge of oncogenesis, in general, coupled with continuing studies of the early molecular and cellular events in radiation induced cancer. The development of models of the radiation induced cancer process founded on sound biological principles will further contribute to more accurate assessments of radiation risk.

2.8. Evaluation of radiation risks

Risk evaluation depends on reliable assessment of the level of exposure, which in turn depends on an accurate determination of internal and external doses. This necessitates research on environmental pathways of radioactive substances to man and on the age dependent metabolism and biokinetics of incorporated radionuclides.

Targeted research will include work to develop more sensitive and delicate instrumentation for measurement of external and internal irradiation and the further extension and application of risk assessment models for the health and environmental impact of discharges of radioactive materials to the environment and of nuclear accidents. Risk estimates converting radiation dose to the probability of induction of health effects will be derived from epidemiological studies of exposed populations, taking into account the knowledge on radiobiological mechanisms.

2.9. Reduction of exposure levels

Criteria, methods and strategies for reducing exposure to ionising radiation from all sources (natural, medical and industrial) have to be developed further with a view to reducing or preventing the induction of health effects. These include aspects of exposure monitoring, techniques for environmental restoration including site restoration, treatment of health consequences including acute radiation damage, risk management for normal and emergency situations and the implementation of the optimization philosophy (ALARA - As Low As Reasonably Achievable) into radiological protection, giving due account to social and economical considerations. These principles will be applied to problems of practical relevance, such as the development of criteria for the recycling of material from decommissioned nuclear facilities; occupational exposure arising from waste management, decommissioning and environmental mitigation; and optimisation strategies and techniques in medical radiological diagnostic procedures.

Historic liabilities

The situation in Eastern and Central Europe and in the Commonwealth of Independent States (CIS) presents liabilities in nuclear safety, which the international community must share not only for altruistic reasons. In addition to humanitarian considerations, the European Union has an interest in, and must continue to assume responsibility for the establishment of safe conditions in neighbouring countries. The accident of Chernobyl was a reminder that radioactive material released in an accident is no respecter of international borders.

The consequences of the Chernobyl accident, of other radiation accidents and of uncontrolled releases of radioactive materials in the CIS have led to environmental contamination and health hazards which represent unique opportunities for initiating collaborative projects, including extensive training and secondment schemes.

The objective of this part of the specific programme is to establish an operational force to work out long term mitigation strategies, to monitor the continuously changing circumstances and to initiate targeted research projects and to provide catalytic links and appropriate coordination between the R&D programme and the technical assistance programmes. The collaboration with the CIS, initiated in 1991, has found broad acceptance in the CIS and must be continued. Some support for EU-partners will come from the Framework Programme but CIS partners will have to be supported by other technical assistance programmes of the EU.

2.10. Consequences of Chernobyl and other radiation accidents

Environmental research in the more heavily contaminated terrestrial and aquatic areas will include the analysis of exposure pathways and the evaluation and validation of existing radioecological data bases. A special aim of the work will be to use the results from the radioecological studies for predictive assessments and to develop improved emergency management systems not only to provide guidance on the mitigation of the consequences of the accident but to provide an effective framework for response to future accidents. They will deal especially with the environmental consequences and applicability of countermeasures in highly contaminated zones, the development of intervention criteria, waste management procedures and environmental restoration.

Health effects studies will concentrate on the development of methods of biological and retrospective dosimetry in close cooperation with epidemiological studies of cancer induction in the more exposed groups of the population. A study of the treatment strategies used for the over-exposed accident victims aims at deriving improved treatment protocols using newly developing methodologies. The occurrence of increased rates of childhood thyroid cancer reported in Belarus and the Ukraine demands systematic research to provide important information on radiation-induced thyroid cancer and an estimate of the extent of this health problem in the future. At the same time the treatment of the thyroid cancer patients will be optimised by the development of therapy protocols.

2.11. Cooperative networks

In the field of radiation protection, a collaboration with institutes of Belarus, the Russian Federation and the Ukraine was initiated in late 1991 which involves some 100 EC institutions and 100 CIS institutions and has led to the establishment of a central laboratory in the Ukraine. The establishment of such a network will reinforce the collaborative research programme between the European Union and the CIS in the whole area of nuclear fission safety. In addition it can be used as a platform for coordination of the many international and bilateral initiatives in these areas.

In the area of waste management and site restoration, similar networks with the Central and Eastern European countries will assist these countries in developing safe solutions for their particular problems. In addition, networks of information exchange would be useful to learn from the Russian experience of waste management. Cooperation in the field of reactor safety will address some problems typical of existing Russian reactor designs as well as research in areas of interest for future plants. The progressive inclusion of these Eastern countries in Community nuclear safety programmes is to be seen as an efficient way to develop a wide ranging safety culture.

3. IMPLEMENTATION OF THE PROGRAMME

3.1. Cost-sharing and concerted actions

The programme will carry out R&D as shared-cost actions and as concerted actions. Shared-cost activities will be co-funded by the Community at levels reflecting the economic and technical risk as well as according to the respective area of research. Particular attention will be paid to large integrated projects which will be defined in consultation with the main partners. Other partners selected from a call for proposals will be associated.
The shared-cost activities will be complemented by concerted actions in matters where mere coordination of the efforts of Member States and their industries could render the Community programme more efficient.

3.2. Dissemination and valorization of results

The rapid and effective dissemination of results will be assured by direct communication of progress reports among network participants, specialist meetings and multi-disciplinary conferences, as well as by systematic publication of annual programme reports, final reports and proceedings of scientific meetings.
In addition, the collection and processing of R&D results in computerized data bases managed under the respective networks will provide readily accessible scientific and technical information.
Public communication and information on the programme activities and results should constitute an important element.

3.3. Training and mobility

Opportunities for training and mobility of scientific and technical staff will be assured by activities such as the "*European Radiation Protection Education and Training*" scheme (ERPET) and the Eurocourses organised together with JRC Ispra. Mobility of researchers will be promoted by staff secondment schemes at the major R&D projects and research grants to bursaries.

3.4. International cooperation

Close cooperation with national and international organisations competent in the fields of nuclear safety, waste management and radiation protection will enable the Community to contribute worldwide to an improvement of nuclear safety and the

protection of man and his environment against the effects of ionizing irradiation. It will enhance the integration of national efforts to improve the competitivity of the European nuclear industry and will give essential input to the regulatory responsibilities of the Community.

Cooperation and integration of research on Nuclear Safety and Safeguards has been well established with third countries such as the USA, Canada, Japan and with some EFTA countries. Together with the collaboration with Central and Eastern European countries (PECO), including the Commonwealth of Independent States which is of particular importance, this will lead to the further harmonisation of national approaches for developing safety standards. Close interaction has also been achieved and will continue with the International Atomic Energy Agency (IAEA), the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA) and the World Health Organisation (WHO), as well as with non-governmental international organisations involved in standardisation and recommendations, such as the International Commission on Radiological Protection (ICRP), the International Commission on Radiation Units and Measurements (ICRU) and the International Standards Organisation (ISO). This international cooperation is the main instrument for achieving worldwide consensus on the fundamental issues of nuclear safety and radiation protection.

Close and extensive cooperation with research institutes and universities of the CIS on the consequences of the Chernobyl accident will help to validate the basic research results obtained from the other actions. The information to be gained on environmental contamination and population exposure is enormously important for bridging between theoretical approaches and real contamination situations.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY
(ECU million)

Field	
Exploring new concepts	7
Reactor safety	50
Fuel cycle	40
Radiological impact on man and the environment	50
Historic liabilities*	13
TOTAL[5,6,7,8,9]	160

* The funding for this activity covers the establishment of an operational team to act as a catalyst and ensure coordination between the research and training programme and the EU's technical assistance programmes. Some support for EU partners in the joint projects will come from the resources available for the framework programme, but the partners from the CIS and Central and Eastern Europe will have to be supported by the technical assistance programmes.

The breakdown between the different headings does not exclude the possibility that projects could come under several headings.

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5 Including 10.7 % for staff expenditure and 6.5 % for administrative expenditure.

6 Including 1.25% for the dissemination and utilization of results.

7 Including at least 15% for fundamental research activities.

8 Of which an estimated 2% is earmarked for funding schemes to promote training for researchers in the fields covered by this specific programme.

9 An amount of ECU 254 million, representing the difference between the amount deemed necessary for the present programme and the amount provided for in the framework programme for research and training activities in the nuclear field (1994-98) for "nuclear safety and safeguards", is allocated to the "specific research and technological development programme to be carried out by the Joint Research Centre, for the European Atomic Energy Community".

ANNEX III

MODALITIES FOR IMPLEMENTING THE PROGRAMME

1. The modalities for the Community's financial contribution are laid down in Annex IV to the Decision on the framework programme of Community actions in the field of research and training for the European Atomic Energy Community (1994-1998).

   The modalities for the participation of undertakings, research centres and universities and for the dissemination of results are laid down in the measures provided for by Article 4 of the Euratom Treaty.

   However, for the purpose of implementing this programme, the following precisions/exceptions shall apply:
   - in addition to the official organisations specified in article 2.2 of the council decision arising from article 7 concerning conditions for participation, national organisations situated in other countries and which are concerned with normalisation or harmonisation of measurement methods have the possibility to participate in the programme on the same conditions as those indicated for other organisations in this article.
   - the participation of European international organisations may be financed on the same basis as that for community organisations in duly specified cases.

2. This programme will be carried out in the form of:

2.1 **Financial participation by the Community in research and training activities** carried out by third parties or by JRC Institutes in association with third parties;

   (a) **Shared-cost activities** covering the following modalities:
   - research and training projects carried out by undertakings, research centres and universities, including consortia for integrated projects with a common theme;
   - support for financing the infrastructure or installations necessary for coordinated action (reinforced coordinated activity).

   (b) **Concerted action**, which consists of coordinating, particularly with the aid of concertation networks, research and training projects already funded by public authorities or private bodies. Concerted action can also include the requisite coordination of thematic networks bringing together manufacturers, users, universities and research centres to work on the same technological or industrial objective under shared-cost research and training activities (cf. first paragraph of 2.1(a)).

   (c) **Specific measures** such as action to promote standardization and measures to provide general tools to research centres, universities and undertakings. The Community's contribution covers up to 100% of the cost of these measures.

2.2 **Preparatory, accompanying and support measures** covering the following modalities:
   - studies in support of this programme and in preparation for possible future activities;
   - conferences, seminars, workshops or other scientific or technical meetings, including intersectoral or multidisciplinary coordination meetings;
   - use of external expertise, including access to scientific databases;
   - scientific publications, including the dissemination, promotion and valorization of the results;

- studies to assess the socio-economic consequences and any possible technological risks associated with all the projects under this programme;
- training activities related to research covered by this programme;
- independent evaluation (including studies) of programme management and of the implementation of the activities.

ANNEX IV

DESCRIPTION OF THE JOINT RESEARCH CENTRE'S (JRC) RESEARCH ACTIVITIES CORRESPONDING TO THE AREAS COVERED BY THIS SPECIFIC PROGRAMME AND THE SUBJECT OF THE PROPOSAL FOR A COUNCIL DECISION FOR THE JRC PROGRAMME (COM(94)70 FINAL - 94/0074 (CNS)).

The JRC contribution will be in the following fields:

- reactor safety,
- fuel cycle safety,
- safeguards and fissile materials management.

Reactor safety

JRC research will be focused mainly on the following areas:

- a contribution to accident prevention: the development of non-destructive analytical techniques (NDA) for the improvement and refinement of inspection procedures and the development of qualification methodologies to facilitate their harmonization;
- probabilistic safety studies: the JRC will contribute to the improvement of methodologies and to the emergence of a consensus on their implementation in safety studies;
- studies conducted through European networks into the mechanisms of component ageing, a method of attenuation, evaluation of the integrity of structures and inspection possibilities;
- studies of serious accidents: these studies will be conducted, on the one hand, through studies of the internal and external phenomena in the containment in experiments with degradation of the reactor core using real materials and operating at a real temperature; these operations will be carried out on a small and a large scale at the JRC and, on the other hand, through a contribution to the study of the release of fission products and the transfer phenomena by participation in the interpretation of the results of experiments simulating accidental releases conducted in other laboratories, in particular the CEA (study of the source-term) and by carrying out aerosol resuspension tests at the JRC. They will be carried out in conjunction with the activities in this field foreseen under indirect actions.

This research will continue to be the subject of a major cooperation effort within the framework of the networks involving European and non-European partners. It is aimed in particular at the development of common design tools intended for industry and the authorities responsible for safeguards.

It will make extensive use of the JRC's ability to set up cooperation networks between the European partners concerned and thus to participate in the implementation of the Community policy provided for in the Treaty.

Fuel cycle safety

The main objective of the studies conducted by the JRC is to reduce the environmental impact of using nuclear energy by means of research into the fuel cycle permitting optimized management of the end of the cycle. They will be conducted in close co-operation with the activities in this field foreseen under indirect actions.

This research will be aimed at improving the understanding of actinides and the plutonium cycle and drawing up the best possible waste management strategy, in particular by minimizing the production of high-level waste. It will take account of changes in reactor design.

It will also be aimed at supporting the Member States' current strategy of deep burial of radioactive waste and exploring management strategies which would make it possible to reduce the amount of waste produced by future fuel-cycle installations. This research will be conducted in close cooperation with national laboratories.

The subjects covered will include:

- studies of the safety of the behaviour of nuclear fuels (UO_2 and mixed oxide),
- study of fundamental and solid-state physico-chemical analyses of actinides,
- study of nuclear aerosols,
- minimization of secondary actinides and other radionucleides with long half-lives in the nuclear fuel cycle,
- plutonium fuel technology,
- characterisation of spent fuel with a view to its elimination,
- radionucleides for medical applications.

Safeguards and fissile materials management

The research conducted at the JRC is aimed at obtaining, in good time, results or new techniques implementation of which is necessary for compliance with obligations arising from safeguards provided for in the Treaty and the Non-Proliferation Treaty.

It is necessary in particular to develop new techniques to meet the new challenges related to the development of the fuel cycle and the strengthening of the control systems.

These activities are aimed at the development and improvement of techniques including:

- non-destructive test techniques using gamma and neutron radiation for the analysis of waste, production waste and irradiated fuel;

- measurements relating to volume and weight in large tanks in fuel production and reprocessing plants;

- sealing techniques and new marking systems for objects containing nuclear materials and for containers;

- surveillance systems using the storage and processing of digital images for automatic surveillance and examination and for improvement of recordings in the long term without inspectors.

A particular effort will be devoted to research on the design of multisensoral integrated systems able to function in the absence of inspectors by using mobile robotic technology. These systems will use intelligent software for the production of data and the compatibility of materials.

These activities will be conducted in particular using the experimental installations Perla ("Performance and training laboratory"), Tame ("Tank measurement") and Lasco ("Surveillance and containment") of the JRC which offer experimental conditions which are representative of reality in an installation.

Lastly, the JRC research in the field of safeguards also forms part of a process of European cooperation as illustrated by the ESARDA network ("European Safeguards Research and Development Association") and international cooperation with the USA, Canada, Japan and Russia.

SPECIFIC PROGRAMME OF RESEARCH AND TRAINING IN THE FIELD OF NUCLEAR SAFETY AND SAFEGUARDS

FINANCIAL STATEMENT

FINANCIAL STATEMENT

1. TITLE OF ACTION

Specific programme of research and training in the field of nuclear safety and safeguards.

2. BUDGET HEADING

B6 - 8111.

3. LEGAL BASIS

Article 7 of the Euratom Treaty.
Council Decision concerning a framework programme of Community activities in the field of research and training for the European Atomic Energy Community (1994 to 1998).

4. DESCRIPTION OF ACTION

4.1 General objectives of the action:

- To promote European cooperation and technological development in the field of nuclear safety and safeguards.
- To develop a global, dynamic approach to allow an improved understanding and quantification of the overall risk associated with the whole nuclear fuel cycle, considering exposure to ionizing radiation from all sources, including other industrial applications, medical applications and natural radioactivity.
- To create opportunities for training and mobility for scientists.

4.2 Fields covered by the programme:

The projects selected will cover research, development and demonstration activities in the following fields:

- Exploring new concepts for safety and waste management;
- Reactor safety in the event of severe accidents;
- Closing the nuclear fuel cycle by means of projects to evaluate the safety of geological disposal of long-lived radioactive waste plus supporting studies;
- Understanding, evaluation and mitigation of the effects of exposure to ionizing radiation, reduction of the remaining uncertainties and quantification of the radiation risk;
- historic liabilities stemming from the Chernobyl and other accidents in Central and Eastern Europe and in the Commonwealth of Independent States.

4.3 Duration of the action

1994 - 1998.

5. CLASSIFICATION OF EXPENDITURE OR REVENUE

Non-compulsory expenditure/differentiated appropriations.

6 TYPE OF EXPENDITURE OR REVENUE

Studies/subsidies

- In principle, the direct actions will be 100% funded.
- The concerted actions may qualify for a contribution of up to 100% of the coordination costs.

Subsidy for joint financing with other sources in the public and/or private sector

- The shared-cost activities comprising RTD projects will qualify for a contribution of not more than 50%.
- Universities and other research centres participating in RTD projects and unable to substantiate their total costs in sufficient detail for the Commission, based on an analytical accounting system, will qualify for 100% funding of the additional costs.
- Other shared-cost activities (for example, networks, training, feasibilty awards or accompanying measures) will qualify for up to 100% of the additional costs or of the costs of the measure.

Staff, administrative and operating costs

These also cover the costs of personnel covered by the Staff Regulations and other staff, studies, meetings of experts, conferences and congresses, information and publications, administrative, technical and operating costs, and certain other internal infrastructure and operating costs for attainment of the objective of the activity of which they are an integral part.

7. FINANCIAL IMPACT

7.1 Method of calculating total cost of action:

* Staff costs: ECU 17.12 million (10.70% of the ECU 160 million deemed necessary).

The 1994 staff levels will be maintained, i.e. 51 posts. These posts break down as follows: 30A + 10 B + 11C.

It is important to note that the staff working on this specific programme will also be responsible for the scientific monitoring and for monitoring the contracts for the activities carried out under the third framework programme and other earlier actions.

* Administrative costs, including personnel not covered by the Staff Regulations: ECU 10.40 million (6.50% of the ECU 160 million deemed necessary).

* Operating costs: ECU 132.48 million (82.80% of the ECU 160 million deemed necessary), including the cost of accompanying measures, evaluations and concertation activities.

7.2 Itemized breakdown of cost (in million ECU):

Exploring new concepts	7	4.3%
Reactor safety	50	31.3%
Fuel cycle	40	25.0%
Radiological impact on man and the environment	50	31.3%
Historic liabilities	13	8.1%
TOTAL	160 (1) (2)	100%

(1) Including ECU 17.12 million (10.70%) for staff costs and ECU 10.40 million (6.50%) for administrative costs.
(2) ECU 254 million is added to this amount for the EAEC programme of the JRC.

7.3 Indicative schedule of appropriations (in million ECU):

The schedule will be established on the basis of the overall amounts for the fourth framework programme adopted indicatively for the periods 1995-96 and 1997-98 at the conciliation meeting on 21 March 1994. The RTD appropriations for each financial year will be proposed and adopted each year on the basis of the resources available in the context of the financial perspective.

Commitment appropriations		Payment Appropriations				
		1995	1996	1997	1998 et seq	TOTAL
1995	67,00	20,84	18,98	12,08	15,10	67,00
1996	71,00		27,15	19,37	24,48	71,00
1997	11,00			7,79	3,21	11,00
1998	11,00				11,00	11,00
TOTAL	160,00	20,84	46,13	39,24	53,79	160,00

8. ANTI-FRAUD MEASURES

Numerous administrative and financial controls have been introduced at every stage of the procedure for awarding and implementing research contracts. These include:

- *Prior to conclusion of the contract*:
  - shortlisting of the proposals on the basis of their scientific merit and of how realistic the research costs are, considering the nature, duration and potential impact of the project;
  - analysis of the financial data submitted by the proposers in the negotiation form.
- *After signature of the contract:*
  - examination of the statements of expenditure before payment at various levels (financial administrator and scientific project manager);
  - on-the-spot inspections of the supporting documents to detect any errors or other irregularities. To tighten up these controls, the Commission has set up a central audit unit which is responsible for all the inspections. The inspections are carried out either by members of the audit unit or, under their supervision, by firms of auditors with which the Commission has concluded framework contracts.

9. ELEMENTS OF COST-EFFECTIVENESS ANALYSIS

9.1 Specific and quantifiable objectives; target population:

Activity 1: Exploring new concepts

To consider alternative approaches to reactor design and the fuel cycle in order to identify promising design-related solutions.

Activity 2: Reactor safety

To validate reactor safety, based on the experience gained from the nuclear power stations in service and on the latest research results.

Activity 3: Fuel cycle

To integrate the efforts undertaken by the Member States to develop the technical basis for a common understanding of the disposal of long-lived radioactive waste, spent fuel and high-level waste.

Activity 4: Radiological impact on man and the environment

To reduce the remaining uncertainties in the quantification of radiation risks arising from ionizing radiation generated in energy production, industry and medicine, as well as from exposure to natural radiation.

Activity 5: Historic liabilities

To establish an operational force to work out strategies for mitigating the consequences of accidents such as the Chernobyl disaster and to act as a catalyst between and coordinate the RTD programmes and the technical assistance and humanitarian aid programmes.

9.2 Grounds for the operation:

Although nuclear energy has reached considerable maturity and excellent safety standards in the European Union, it is far from universally accepted. The programme therefore aims at stimulating wide collaboration to develop a global and dynamic approach to nuclear safety and produce a world-wide "safety culture".
Trans-frontier cooperation will make it possible to bring up to date the basic standards on the safety of the nuclear cycle and radiation protection.
The programme will ensure that Europe maintains its expertise in the various fields concerned and will encourage pan-European collaboration to the benefit of all the partners involved.

9.3 Monitoring and evaluation of the action (modalities and frequencies planned):

In order to contribute to the overall assessment of Community activities provided for in Article 4(2) of the Decision adopting the framework programme, the Commission shall, in due course, have an assessment made by independent experts of the activities carried out in the field directly covered by this programme, and of their management during the five years preceding the assessment.

At the end of this programme, the Commission shall instruct independent experts to conduct a final evaluation of the results achieved compared with the objectives set out in Annex III to the framework programme and Annex I to the Decision adopting this programme. The final evaluation report shall be forwarded to the Council, the European Parliament and the Economic and Social Committee.

Proposal for a

COUNCIL DECISION

[redacted]

adopting a specific programme of research and training

in the field of controlled thermonuclear fusion

(1994-98)

PROPOSAL FOR A COUNCIL DECISION
of .....

adopting a specific programme of research and training (1994-98) in the field of controlled thermonuclear fusion

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular Article 7 thereof,

Having regard to the proposal from the Commission,[1] which has consulted the Scientific and Technical Committee,

Having regard to the opinion of the European Parliament,[2]

Having regard to the opinion of the Economic and Social Committee,[3]

Whereas, by Decision ../../Euratom,[4] the Council adopted a framework programme of Community activities in the field of research and training for the period 1994-98 specifying *inter alia* the activities to be carried out in the field of controlled thermonuclear fusion; whereas this Decision takes account of the grounds set out in the preamble to that Decision;

Whereas Article 2 of Decision ../../Euratom[4] specifies that the framework programme is to be implemented through specific programmes adopted in accordance with Article 7 of the Treaty; whereas each specific programme is to specify its precise objectives in accordance with the scientific and technical objectives referred to in Annex III to the Decision, define the detailed rules for implementation, fix its duration and provide for the resources deemed necessary;

Whereas this programme will be carried out mainly through shared-cost activities, concerted actions and preparatory, accompanying and support measures;

Whereas Decision ../../Euratom (framework programme 1994-98) lays down that the overall maximum amount of the framework programme (1994-98) will be reexamined by 30 June 1996 at the latest with a view to its being increased; whereas, as a consequence of this reexamination, the amount deemed necessary to carry out this programme could increase;

Whereas the content of the framework programme of Community activities in the field of

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[1] OJ No ..., ..., p.

[2] OJ No ..., ..., p.

[3] OJ No ..., ..., p.

[4] OJ No ..., ..., p.

research and training was established in accordance with the principle of subsidiarity; whereas this specific programme specifies the content of the activities to be carried out in accordance with this principle in the field of controlled thermonuclear fusion;

Whereas, as is laid down in Annex III to Decision ../../Euratom,[4] the Community needs a "Community Fusion" programme whose long-term objective would be the joint creation of prototype reactors which are safe and which respect the environment; whereas the programme incorporates all the activities undertaken in the Member States in the field of controlled thermonuclear fusion by magnetic confinement;

Whereas Decision ../../Euratom (framework programme 1994-98) lays down that Community action is justified if, *inter alia*, the research helps to reinforce the economic and social cohesion of the Community and to encourage its harmonious development while at the same time meeting the objective of scientific and technical quality; whereas this programme is intended to help meet these objectives;

Whereas this programme will help to strengthen synergy between the research and training activities carried out in the field of controlled thermonuclear fusion by research centres, universities and undertakings established in the Member States and between these and the corresponding Community research and training activities;

Whereas the implementation of the JET (Joint European Torus) project was entrusted to the JET Joint Undertaking, set up by Decision 78/471/Euratom and last amended by Decision 91/677/Euratom;

Whereas the network of Associations is a major player in the implementation of the Community's controlled thermonuclear fusion activities;

Whereas, by virtue of Article 101 of the Treaty, the Community has concluded cooperation agreements in the field of controlled thermonuclear fusion and plasma physics with the Kingdom of Sweden and the Swiss Confederation; whereas the Community has concluded an agreement on cooperation in the Engineering Design Activities for the International Thermonuclear Experimental Reactor (ITER-EDA) with Japan, the Russian Federation and the United States of America;

Whereas this programme also comprises activities for the dissemination and utilization of research results, in particular vis-à-vis small and medium-sized enterprises, as well as activities promoting the mobility and training of researchers within this programme to the extent necessary for the proper implementation of the programme;

Whereas basic research in the field of controlled thermonuclear fusion must be encouraged so as to enable innovative concepts to be developed;

Whereas an assessment should be made of the economic and social impact and any technological risks associated with the activities carried out under this programme;

Whereas progress with this programme should be continuously and systematically monitored with a view to adapting it, where appropriate, to scientific and technological developments

in this area; whereas in due course there should be an independent evaluation of progress with the programme so as to provide all the background information needed in order to determine the objectives of the next framework programme of research and training for the European Atomic Energy Community; whereas at the end of this programme there should be a final evaluation of the results obtained compared with the objectives set out in this Decision;

Whereas the JRC may participate in the indirect activities covered by this programme;

Whereas the JRC will also contribute, through its own programme of direct activities, to the attainment of the Community research and training objectives in the areas covered by this programme,

HAS ADOPTED THIS DECISION:

Article 1

A specific programme of research and training for the European Atomic Energy Community in the field of controlled thermonuclear fusion, as set out in Annex I, is hereby adopted for the period from ***(date of adoption of this programme)*** to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 794 million, including around 17 % for staff and administrative expenditure.

2. An indicative breakdown of this amount is given in Annex II.

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of and in accordance with the Decision referred to in Article 1(3) of Decision ../../Euratom (framework programme 1994-98).

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the scientific and technological priorities set in the framework programme of Community activities in the field of research and training for the European Atomic Energy Community (1994-98).

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continuously and systematically monitor progress with this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. Where necessary, it shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. At the end of this programme, the Commission shall instruct independent experts to conduct a final evaluation of the results achieved compared with the objectives set out in Annex III to the framework programme of research and training (1994-98) and Annex I to this Decision. The final evaluation report shall be forwarded to the Council, the European Parliament and the Economic and Social Committee.

Article 5

1. The Commission shall be responsible for the implementation of the programme.

2. The Commission shall be assisted in the implementation of the programme by the Consultative Committee for the Fusion Programme set up by the Council Decision of 16 December 1980.

Article 6

This Decision is addressed to the Member States.

Done at Brussels, ...

For the Council
The President

ANNEX I

SCIENTIFIC AND TECHNICAL OBJECTIVES AND CONTENT

Introduction

This programme fully reflects the approach embodied in the Framework Programme of Community activities in the field of research and training for the European Atomic Energy Community (1994-98). Its content takes account of the conclusions of the Seminar on European Strategy for Energy Research and Technological Development (Venice, November 1993).

The long-term objective of the Community Fusion Programme, embracing all activities undertaken in the Member States (plus Sweden and Switzerland) in the field of controlled thermonuclear fusion by magnetic confinement, is the joint creation of safe, environmentally sound prototype reactors, which should result in the construction of economically viable power stations which will meet the needs of potential users; in this context particular attention will be paid to the constraints imposed by the requirements of power utilities (Decision ../../Euratom concerning the Framework Programme 1994-98).

Progress towards this objective, which is shared by the world's four major fusion programmes (Euratom, Japan, Russia and the USA), which are of similar size, has a time-horizon measured in decades. Within Europe, integration of all magnetic fusion research into one Community programme has been essential for optimum use of the available human and financial resources; this integration is fully in line with the coordination of research activities recommended by the Commission in its White Paper (COM(93) 700), which was adopted by the European Council on 10-11 December 1993. Individually, none of the Member States could have undertaken a project the size of JET or been recognized as an equal partner in the world-wide collaboration on the ITER experimental reactor. Indeed, the quality of the research and the experience gained through intra-Community collaboration have placed the Community in a strong position in the ITER cooperation.

The long timespan and the large human and financial effort needed to attain this objective call for a concentration of Community action on the objective in hand, the complete cohesion of the network of organizations associated in the Community action and the full exploitation of cooperation with the major fusion programmes outside the Community. Safety and environmental issues will be central to the construction of the following large devices, which, after JET, are included in the strategy leading towards the prototype commercial reactor:

- an experimental reactor (Next Step), the overall objective of which is to demonstrate the scientific and technological feasibility of fusion energy for peaceful purposes;

- a demonstration reactor (DEMO) capable of producing significant quantities of electricity.

For the period 1994-98, the priority objective is to establish the engineering design of the Next Step within the framework of the quadripartite cooperation between Euratom, Japan, Russia and the USA on the Engineering Design Activities for the International Thermonuclear Experimental Reactor (ITER-EDA).

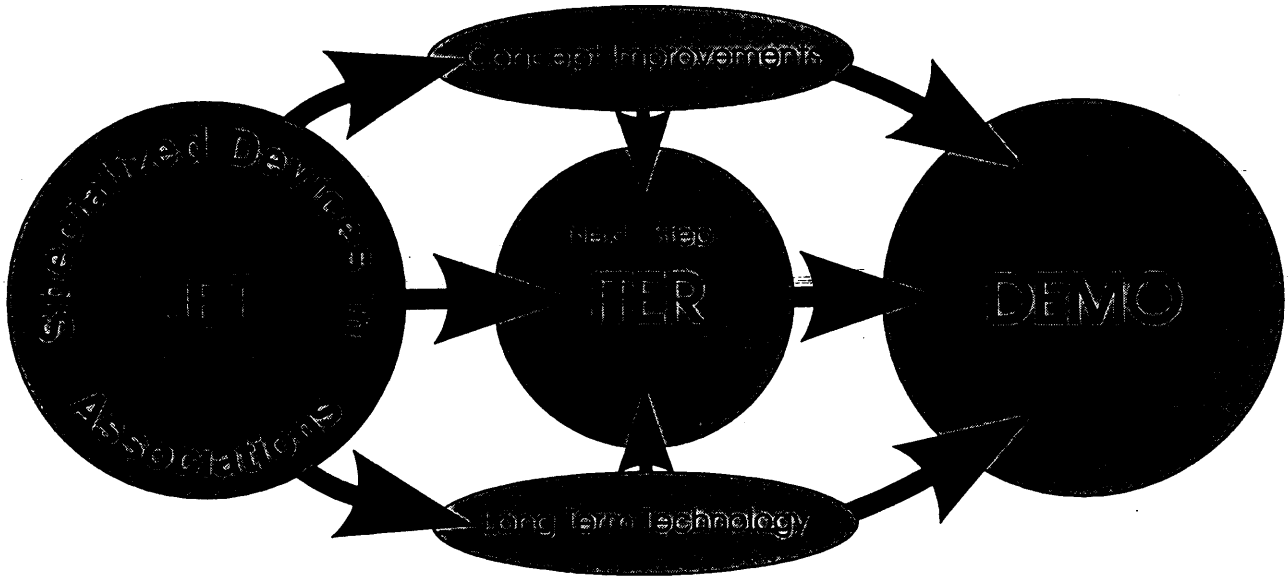
Specialized studies will also be needed to look at possible improvements to concepts in plasma physics and plasma engineering, as well as to carry out the long term technology developments required for progressing towards the exploitation of fusion as an energy source. The results of such studies will be of benefit both in the operation of ITER and, in the longer term, in the conceptual definition of DEMO.

In the period 1994-98, therefore, the proposed strategy calls for the simultaneous development of three areas of activity, as represented below, on which efforts will be concentrated mainly by means of shared-cost actions.

- Next Step Activities: on the one hand the design proper, and on the other hand the R&D supporting the design, construction and operation of the Next Step;

- Concept Improvements: DEMO-oriented R&D on plasma physics and engineering;

- Long Term Technology: DEMO- and reactor-oriented R&D on technology.



Research will continue to focus on controlled thermonuclear fusion by magnetic confinement in toroidal geometry. The present keep-in-touch activity with other approaches to controlled thermonuclear fusion, and in particular inertial confinement, will be continued and if possible expanded to an international framework, as recommended at the Venice Seminar.

Environmental and safety criteria will play an essential role in the progress of the whole Fusion Programme.

During this process care will be taken to :

- strengthen further the cooperation between Associations, as well as the mobility of research workers;
- encourage the involvement of industry;
- extend the scope of international collaboration;
- step up the synergy between research and advanced training.

Areas of scientific and technical activity

Next Step Activities

The ITER-EDA include the design proper by the Joint Central Team and by the Home Teams of the four Parties, plus the supporting R&D in physics and technology by the Home Teams. For the Euratom Party, activities other than the participation in the Joint Central Team will be coordinated by the NET Team and carried out mainly by the Associations, industry (with increasing involvement), JET and the Joint Research Centre (JRC) .

Plasma physics and plasma engineering R&D in support of the ITER-EDA will be pursued on the JET and on specialized devices in the Associations, with the focus on particle and energy exhaust, the heating, confinement and disruption of plasma, and long plasma pulses. JET's main task is to establish reliable methods of plasma purity control under conditions relevant for the Next Step and to conduct high-performance operations in deuterium-tritium plasmas.

The ITER-EDA technology and design tasks allocated to the Community will be performed primarily in the Associations, in the JRC, and in industry. In order both to make the Community more competitive for the construction of ITER and to maintain the option of proceeding towards a European Next Step should cooperation on ITER prove too difficult to continue, the necessary competence will be developed in all key technologies for the Next Step, in particular in the fields of superconducting magnets, plasma facing components, operational and environmental safety, the fuel cycle and highly reliable remote handling for maintenance and decommissioning of the device in its particular environment. The present generation of technology test facilities will be intensively exploited. Specialised laboratories in the JRC, JET, and the Associations will help demonstrate the safe handling of tritium.

A European candidate site for the construction of the Next Step will be identified and qualified.

Protocol 1 to the ITER-EDA Agreement covers the period up to March 1994. A proposal to conclude Protocol 2 will be submitted to the Council in time to allow the ITER-EDA to continue without interruption. The completion of the ITER-EDA is scheduled for July 1998. A decision about where, when and within what framework to build the Next Step should therefore be taken during the period under consideration; before a firm decision is taken to commit the funds needed for the construction of a Next Step device, and in principle not later than 1996, a rigorous, independent assessment of the prospects for fusion should be undertaken, and its conclusions based on evidence of real progress towards the programme's ultimate goal.

Concept Improvements

Research on concept improvements for the Tokamak and configurations akin to it are essential, in the longer term, for the definition of DEMO; this research should also help finalize the design of the Next Step and prepare its operation.

Improvements will have to be made to the current techniques for tackling certain plasma physics and plasma engineering problems, most of them common to all toroidal magnetic confinement devices. These improvements could require not only the extension of running programmes, but also the upgrading of existing devices and the construction of new ones. More specifically, studies on improved confinement regimes, magneto-hydrodynamic stability, plasma-wall interaction, fuelling and exhaust, heating and current drive, will be carried out on existing devices: TORE-SUPRA, ASDEX-U, TEXTOR, FTU, COMPASS, START, TCV, RTP, ISTTOK, TJ-I-U, TJ-II, WVII-AS, RFX and EXTRAP T-2. New plasma diagnostic methods will be developed in the Associations to support these studies. In synergy with experimental activities, activities in theoretical physics will be focused principally on interpretation of experimental results, modelling of thermonuclear plasmas and the development of innovative concepts. The possibility will also be studied of using advanced fuels such as the deuterium-helium3 mixture in future commercial reactors.

Preparatory activities are under way to upgrade existing devices and construct new ones. The most advanced relate, in particular, to:

- the engineering design and prototype development for a possible large stellarator (WVII-X) to demonstrate the advanced performance of that configuration; conceptual studies on the reactor potential of stellarators will be developed;
- a possible compact Tokamak, aiming at ignition. A revised proposal may be submitted to the Consultative Committee for the Fusion Programme (CCFP) for in-depth examination;
- the possible upgrading of some Tokamaks, notably TORE-SUPRA.

Long-Term Technology

The long-term technology effort will be expanded with a view to providing technically and environmentally acceptable solutions to the technical problems of using fusion power as an energy source. Environmental acceptability, safety and economic viability will ultimately be the keys to the widespread introduction of fusion power. This long-term technology effort will be undertaken in the Associations, in the JRC and in industry, and will include in particular:

- development of tritium breeding blankets, with a view to building DEMO-relevant blanket modules to be tested in ITER;

- development of radiation resistant and low activation materials; testing these materials will require the availability of a high energy neutron source. The engineering design of such a facility should be started during the period 1994-98, preferably within an international framework;

- further analysis of the safety and social acceptability of fusion power. In particular, analysis and assessment of possible risks associated with fusion power and its future large facilities, and the integration of all possible measures to prevent or minimize these risks will be an important part of the activities.

Implementation

According to Council Decision 91/677/Euratom[1], the period 1994-98 should see the ending of the JET Joint Undertaking, presently the major focus of fusion research in Europe. The CCFP is currently assessing the expediency of a possible proposal to extend JET to perform specific tasks in support of ITER (in particular, testing a divertor similar to that designed for ITER). This assessment forms part of a more general examination of the possibility of upgrading existing devices or constructing new ones, as mentioned in the section "Concept Improvements". After the end of the Joint Undertaking, the acquired scientific data will be fully exploited. The JET expertise will be transferred to other parts of the Fusion Programme, in particular to ITER activities. Where appropriate, JET's facilities will continue to be operated, within organizational frameworks to be defined; in particular, research on JET decommissioning could be made part of the Programme's activities.

Even before the ending of the JET Joint Undertaking, cooperation between the Associations will be extended further. New forms of cooperation between the Associations will be established to take into account the European nature and the limited duration of research projects. Joint projects carried out by formal groupings of Associations as consortia for integrated actions will be encouraged by the Commission

[1] Council Decision 91/677 EURATOM of December 1991 stipulates: "*The Joint Undertaking shall be established for a period until 31 December 1996.*"

through an adaptation of the existing arrangements. The Associations and JRC[2] will have to provide a substantial contribution to the physics and technology programmes of the ITER during its design, construction and operation.

Industry will be encouraged to participate more fully, with the twin aim of introducing industrial expertise into the realization of the Next Step and ensuring that European industry will master all the key technologies needed to build future fusion reactors. The measures introduced under the 1990-94 programme to involve European industry in the Community's contribution to the ITER-EDA, in the design proper as well as in the accompanying R&D, will be reviewed and adapted as necessary. In particular, joint "Fusion-Industry" seminars will be organized to help develop the dissemination and exploitation of the scientific and technical results of the Fusion Programme.

The possibility will be explored of extending international cooperation beyond ITER, notably through joint planning with the world's major fusion programmes. Possible areas of cooperation are a material test facility with a powerful high energy neutron source, and specialized devices for concept improvements.

Considering the long-term effort required for the exploitation of fusion power, great importance will be attached to maintaining the excellence and cohesion of the research teams within the Community, developing the mobility of scientists and engineers and fostering the synergy between research and advanced training, by strengthening the links with the wider European scientific community. In particular, Associations will be encouraged to collaborate with universities which are active in hot-plasma physics.

The indicative amount of funding provided for in this Decision will not be sufficient to maintain, as was recommended by the Fusion Programme Evaluation Board[3], the same volume of activities during 1994-98 as in the previous Programmes. Even if the Council, by no later than 30 June 1996, increases the amount of funding allocated to the present programme within the limits laid down in the Decision on the Framework Programme, measures aiming at a greater selectivity of the activities to be performed and a stepwise implementation of new actions will be necessary.

The decentralized management structure of the Fusion Programme, inherent to its network structure, has proved to be efficient and will be maintained.

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[2] A more detailed description of the JRC's research activities, which are defined in a proposal for a separate Council decision, is given in Annex IV for information in order to ensure the transparency in relation to their complementarity with corresponding indirect actions.

[3] EUR 1304/1990

ANNEX II

INDICATIVE BREAKDOWN OF FUNDS

		%
Area 1:	Next Step Activities	40 - 50[1]
Area 2:	JET Joint Undertaking	22 - 32[2]
Area 3:	Concept Improvements	22 - 32
Area 4:	Long-term Technology	5 - 9
		100 (ECU 794 million)[3] [4] [5]

The breakdown between different areas does not exclude the possibility that projects could cover several areas. In particular, safety and environmental issues, which will determine the evolution of the Fusion Programme, will be addressed in all areas; in JET, these issues are an integral part of the exploitation of the device; in Areas 1, 3 and 4 approximately 10 % of the total will be allocated to these issues.

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[1] Including design proper and the necessary R & D support in physics and technology provided in the Associations and by industry.

[2] The activities of the Jet Joint Undertaking, which has its own legal personality, are geared mainly towards support for the Next Step.

[3] For areas 1, 3 and 4, this includes staff costs (about 10%, including all community staff in the ITER Joint Central Team) and administrative costs (less than 2%). For area 2, the budget of the JET Joint Undertaking includes provisions for a maximum of 181 temporary agents assigned to the JET Joint Undertaking within the meaning of Article 2(a) of the Conditions of Employment of Other Servants of the European Community; the Community participation in the JET budget is about 75%.

[4] An amount of ECU 46 million, representing the difference between the amount deemed necessary for the present programme and the amount provided for in the framework programme for research and training activities in the nuclear field (1994-98) for "Controlled Thermonuclear Fusion", is allocated to the "specific research and technological development programme to be carried out by the Joint Research Centre, for the European Atomic Energy Community".

[5] Including about 10 % for basic research.

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial participation are those laid down in Annex IV to the Decision on the framework programme of Community activities in the field of research and training for the European Atomic Energy Community (1994-98).

   The detailed rules for implementing this programme, referred to in Article 3, encompass research and technological development projects, the JET Joint Undertaking, accompanying measures and concerted actions. These must be selected with regard to the criteria listed in Annex II to Decision ../../Euratom[1] and the objectives set out in Annex I to this programme.

   Participation in the programme, within the meaning of Article 2(2) of the Council Decision on the rules for participation in the specific programmes of the European Atomic Energy Community, is limited to international organizations located in Europe and to the entities referred to in Article 2(2)(c) of the abovementioned Council Decision.

2. This programme will be carried out through:

2.1 **Financial participation by the Community in research and training activities** carried out by third parties or by the institutes of the JRC with third parties (Europe-based international research organizations can be financed exceptionally on the same basis as Community organizations).

   (a) ***Shared-cost activities***:

   Projects will be covered by shared-cost research and technological development contracts within the framework of the contracts of Association with Member States (plus Sweden and Switzerland) or organizations in the Member States, or within the framework of the Jet Joint Undertaking, the Net agreement, which takes account of the Community's participation in ITER-EDA, or other contracts of limited duration, in particular with organizations in the Member States which do not possess Associations.

   The Community's financial contribution to the current expenditure of the Associations and to contracts of limited duration will, as a rule, be fixed at the uniform rate of around 25%. Once it has consulted the CCFP the Commission can finance:

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[1] OJ L ..., ..., p.

- investment costs of specifically defined projects, at a uniform rate of around 45%;

- certain tasks which can only be carried out by industry, up to a ceiling rate of 100%.

The detailed rules for Community contributions to the JET Joint Undertaking are defined in the Joint Undertaking's Statutes, adopted by the Council in Decision 78/471/Euratom[2] and last amended by Decision 91/677/Euratom[3].

Community participation in the ITER design activities (ITER-EDA) is defined in the EDA Agreement,[4] its Protocols (and the accompanying documents) and a bilateral Agreement (being drawn up) on the participation of Canada in the Community's contribution to ITER-EDA. As indicated in Article 3 of the Agreement, the EDA is to be implemented by successive Protocols; Protocol 1, concluded at the same time as the Agreement on 21 July 1992, will expire at the moment Protocol 2 enters into force, and by 20 March 1994 at the latest. Protocol 2 is intended to cover the remaining period of the EDA (until July 1998). The detailed arrangements for Community participation in ITER-EDA are peculiar to the specific framework (Association contracts, JET Joint Undertaking, NET Agreement, mobility agreement, agreement with Canada) within which these activities are conducted. The 25% of the Joint Central Team which corresponds to the Community's participation is made up of Commission agents.

Projects will be selected on the basis of the ordinary procedures set out in the contracts of Association, the JET Statutes, the NET Agreement, the ITER-EDA Agreement and any other Community-wide agreements that may be concluded following the opinion of the consultative committee referred to in Article 5(2). Where the consultative committee grants priority status to a project, all the Associations have the right to take part in the experiments carried out on the equipment thus constructed.

(b) ***Concerted actions***, which consist in coordinating, notably in the form of concertation networks, the research and training projects already being financed by the public authorities or private bodies. A concerted action may also provide the coordination necessary for the operation of thematic networks which, through shared-cost actions, unite manufacturers, users, universities and research centres around a single technological or industrial objective.

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2 OJ L 151, 7.6.1978, p. 10.

3 OJ L 375, 31.12.1991, p. 9.

4 OJ L 244, 26.8.1992, p. 14.

2.2 **Preparatory, accompanying and support measures** as follows:

- studies to support this programme and to prepare for any future activities;

- conferences, seminars, workshops or other scientific or technical meetings, including meetings on intersectoral or multidisciplinary coordination;

- use of outside expertise, including access to scientific data bases;

- scientific publications, including the dissemination, promotion and exploitation of results (in coordination with the activities conducted under Action 3);

- studies evaluating the socio-economic consequences and any technological risks attaching to the programme projects as a whole;

- training activities linked to the research covered by the programme;

- independent evaluation (including studies) of the management and implementation of the programme's activities.

ANNEX IV

DESCRIPTION OF THE JOINT RESEARCH CENTRE'S (JRC) RESEARCH ACTIVITIES CORRESPONDING TO THE AREAS COVERED BY THIS SPECIFIC PROGRAMME AND THE SUBJECT OF THE PROPOSAL FOR A COUNCIL DECISION FOR THE JRC PROGRAMME (COM(94)70 FINAL - 94/0074 (CNS)).

This activity forms part of the Community fusion research programme. It is aimed at improving the pool of knowledge and the technology of the "safety and environment" dimension of future machines intended for the European programme. The bulk of the work will be dedicated to support for the International Thermonuclear Experimental Reactor (ITER) but may also involve any other fusion reactor.

For this purpose, the JRC has designed and constructed the European Tritium Handling Laboratory (ETHEL). The aim of this installation is the development of methods of handling tritium, but special attention will be paid to the verification and validation of methods of preventing and reducing tritium and activation product waste in the work area and the environment under both normal and accident conditions.

The laboratory is also able to offer research capability to any other European organization which is a member of the Community fusion programme or is associated with it.

Part of the activities will concern the development and characterization of materials to meet the following requirements: good compatibility with tritium, behaviour as effective barriers against infiltration of tritium with low induced radioactivity. The JRC, which has long experience in this field, will make a significant contribution within the framework of the ITER and for the longer term requirements of the Fusion Programme.

In addition to these activities, more general studies, including operational safety during maintenance, will be conducted by the JRC in line with specific demands relating to the ITER project or, more broadly, the Fusion Programme, in particular studies on low-activation materials and remote handling.

FINANCIAL STATEMENT

1. TITLE OF OPERATION

Scientific programme of research and training 1994-98 in the field of controlled thermonuclear fusion.

2. BUDGET HEADING

B6-8121

3. LEGAL BASIS

Article 7 of the Euratom Treaty.
Article 9 of the Statutes of the Joint European Torus (JET) Joint Undertaking.
Council Decision concerning a framework programme of Community activities in the field of research and training for the European Atomic Energy Community (1994-98).

4. DESCRIPTION OF OPERATION

4.1 General objective

The long-term objective is the joint creation of safe, environmentally sound prototype reactors. The programme incorporates all the activities undertaken in the Member States (plus Sweden and Switzerland) in the field of controlled thermonuclear fusion by magnetic confinement.

4.2 Duration

1994-98

5. CLASSIFICATION OF EXPENDITURE OR REVENUE

Non-compulsory expenditure/differentiated appropriations.

6. TYPE OF EXPENDITURE OR REVENUE

Studies/subsidies:

- In principle, the direct activities will be 100% funded.

- The concerted activities may qualify for a contribution of up to 100% of the coordination costs.

Subsidy for joint financing with other sources in the public and/or private sector:

- The Community's financial contribution to the current expenditure of the Associations will, as a rule, be fixed at the uniform rate of around 25%. Once it has consulted the CCFP the Commission can finance:

  - investment costs of specifically defined projects, at a uniform rate of around 45%;
  - certain tasks which can only be carried out by industry, up to a ceiling rate of 100%.

- The financial contribution to the JET Joint Undertaking will be set at a rate of around 75%.

- The financial contribution to the specific Next Step activities is defined in the NET Agreement.

- Universities and other research centres participating in shared-cost activities outside the framework of association contracts and unable to substantiate their total costs in sufficient detail for the Commission, based on an analytical accounting system, will qualify for up to 100% funding of the additional costs.

- Other shared-cost activities (for example, networks, training, feasibility awards or accompanying measures) will qualify for up to 100% of the additional costs or of the costs of the measure.

Staff and administrative and operating costs

These also cover the costs of personnel covered by the Staff Regulations and other staff, studies, meetings of experts, conferences and congresses, information and publications, administrative, technical and operating costs, and certain other internal infrastructure and operating costs for attainment of the objective of the activity of which they are an integral part.

7. FINANCIAL IMPACT

7.1 Method of calculating total cost of operation

* Staff costs: ECU 119.10 million (around 15% of the ECU 794 million deemed necessary)

The 1994 staff levels are as follows:

- 144 officials, breaking down as follows: 117A + 24B + 3C.

- A maximum of 181 temporary staff assigned to the JET Joint Undertaking within the meaning of Article 2(a) of the conditions of employment of other servants of the European Communities.

New posts will be warranted by the configuration of the programme, which includes a new and important field of activity not covered by the third framework programme, including the International Thermonuclear Experimental Reactor - Experimental Design Activities (ITER-EDA).

N.B. The staff of this specific programme will also be responsible for the scientific and contractual follow-up to the activities begun under the third framework programme.

* Administrative costs, including staff not covered by the Staff Regulations: ECU 15.88 million (2% of the ECU 794 million deemed necessary).

* Operating costs: ECU 659.02 million (83% of the ECU 794 million deemed necessary), including the cost of accompanying measures, evaluations and concertation activities.

7.2 Itemized breakdown of cost (ECU million)

Next Step activities	317.60-397.00	40-50%
JET Joint Undertaking	174.68-254.08	22-32%
Concept improvements	174.68-254.08	22-32%
Long-term technology	39.70-71.46	5-9%
TOTAL	794[1] [2]	100%

(1) Including ECU 119.10 million (around 15%) for staff costs and ECU 15.88 million (2%) for administrative costs.

(2) In addition to this amount, ECU 46 million are for the EAEC programme of JRC.

7.3 Indicative schedule of appropriations:

The schedule will be established on the basis of the overall amounts for the fourth framework programme adopted indicatively for the periods 1995-96 and 1997-98 at the conciliation meeting on 21 March 1994. The RTD appropriations for each financial year will be proposed and adopted each year on the basis of the resources available in the context of the financial perspective.

Commitment appropriations		Payment appropriations				
		1995	1996	1997	1998 *et seq.*	TOTAL
1995	256.00	130.37	64.83	24.75	36.05	256.00
1996	183.00		140.54	26.23	16.23	183.00
1997	183.00			134.34	48.66	183.00
1998	172.00				172.00	172.00
TOTAL	794.00	130.37	205.37	185.32	272.94	794.00

8. WHAT ANTI-FRAUD MEASURES ARE PLANNED?

Numerous administrative and financial controls have been introduced at every stage of the procedure for awarding and implementing research contracts. These include:

Prior to the conclusion of the contract:

- Shortlisting of the proposals on the basis of their scientific merit and of how realistic the research costs are, considering the nature, duration and potential impact of the project.

- Analysis of the financial data submitted by the proposers in the negotiation form.

After signature of the contract:

- Examination of the statements of expenditure before payment at various levels (financial control and scientific manager).

- On-the-spot inspections of the supporting documents to detect any errors or other irregularities. To tighten up these controls, the Commission has set up a central audit unit which is responsible for all the inspections. The inspections are carried out either by members of the audit unit or, under their supervision, by firms of auditors with which the Commission has concluded framework contracts.

9. ELEMENTS OF COST-EFFECTIVENESS ANALYSIS

9.1 Programme objectives

The long-term objective of the Community Fusion Programme, embracing all activities undertaken in the Member States (plus Sweden and Switzerland) in the field of controlled thermonuclear fusion by magnetic confinement, is the joint creation of safe, environmentally sound prototype reactors, which should result in the construction of economically viable power stations which will meet the needs of potential users; in this context particular attention will be paid to the constraints imposed by the requirements of power utilities (Decision ../../Euratom concerning the Framework Programme 1994-98).

For the period 1994-98, the priority objective is to establish the engineering design of the Next Step within the framework of the quadripartite cooperation between Euratom, Japan, Russia and the USA on the Engineering Design Activities for the International Thermonuclear Experimental Reactor (ITER-EDA).

Specialized studies will also be needed to look at possible improvements to concepts in plasma physics and plasma engineering, as well as to carry out the long term technology developments required for progressing towards the exploitation of fusion as an energy source. The results of such studies will be of benefit both in the operation of ITER and, in the longer term, in the conceptual definition of DEMO.

In the period 1994-98, therefore, the proposed strategy calls for the simultaneous development of three areas of activity on which efforts will be concentrated mainly by means of shared-cost actions;

- Next Step Activities:

  on the one hand the design proper, and on the other hand the R&D supporting the design, construction and operation of the Next Step;

- Concept Improvements:

  DEMO-oriented R&D on plasma physics and engineering;

- Long Term Technology:

  DEMO- and reactor-oriented R&D on technology.

Plasma physics and plasma engineering R&D in support of the ITER-EDA will be pursued on the JET and on specialized devices in the Associations. JET's main task is to establish reliable methods of plasma purity control under conditions relevant for the Next Step and to conduct high-performance operations in deuterium-tritium plasmas.

In order both to make the Community more competitive for the construction of ITER and to maintain the option of proceeding towards a European Next Step should cooperation on ITER prove too difficult to continue, the Associations, the JRC and industry will develop the necessary competence in all key technologies for the Next Step.

A European candidate site for the construction of the Next Step will be identified and qualified. A decision about where, when and within what framework to build the Next Step should be taken during the period covered by this programme.

Research on concept improvements for the Tokamak and configurations akin to it are essential, in the longer term, for the definition of DEMO; this research should also help finalize the design of the Next Step and prepare its operation.

Preparatory activities are under way to upgrade existing devices and construct new ones. The most advanced relate, in particular, to:

- the engineering design and prototype development for a possible large stellarator (WVII-X) to demonstrate the advanced performance of that configuration;

- a possible compact Tokamak, aiming at ignition. A revised proposal may be submitted to the Consultative Committee for the Fusion Programme (CCFP) for in-depth examination;

- the possible upgrading of some Tokamaks, notably TORE-SUPRA.

The long-term technology effort will be expanded with a view to providing technically and environmentally acceptable solutions to the technical problems of using fusion power as an energy source.

Research will continue to focus on controlled thermonuclear fusion by magnetic confinement in toroidal geometry. The present keep-in-touch activity with other approaches to controlled thermonuclear fusion, and in particular inertial confinement, will be continued and if possible expanded to an international framework.

Environmental and safety criteria will play an essential role in the progress of the whole Fusion Programme.

During this process care will be taken to :

- strengthen further the cooperation between Associations, as well as the mobility of research workers;
- encourage the involvement of industry;
- extend the scope of international collaboration;
- step up the synergy between research and advanced training.

9.2 Grounds for the operation

The long term objective of the Programme is shared by the world's four major fusion programmes (Euratom, Japan, Russia and the USA), which are of similar size, and has a time-horizon measured in decades. Within Europe, integration of all magnetic fusion research into one Community programme has been essential for optimum use of the available human and financial resources. This integration is fully in line with the coordination of research activities recommended by the Commission in its White Paper (COM(93) 700), which was adopted by the European Council on 10-11 December 1993. Individually, none of the Member States could have undertaken a project the size of JET or been recognized as an equal partner in the world-wide collaboration on the ITER experimental reactor. Indeed, the quality of the research and the experience gained through intra-Community collaboration have placed the Community in a strong position in the ITER cooperation.

The long timespan and the large human and financial effort needed to attain this objective call for a concentration of Community action on the objective in hand, the complete cohesion of the network of organizations associated in the Community action and the full exploitation of cooperation with the major fusion programmes outside the Community. Safety and environmental issues will be central to the construction of the following large devices, which, after JET, are included in the strategy leading towards the prototype commercial reactor:

- an experimental reactor (Next Step), the overall objective of which is to demonstrate the scientific and technological feasibility of fusion energy for peaceful purposes;

- a demonstration reactor (DEMO) capable of producing significant quantities of electricity.

9.3 Evaluation

With the assistance of the Consultative Committee for the Fusion Programme (CCFP) set up by the Council Decision of 16 December 1980, the Commission will continuously and systematically monitor progress with this programme in relation to its objectives. It will in particular assess whether the objectives, priorities and financial resources are still appropriate. Where necessary, it will submit proposals to adapt or supplement the programme depending on the results of this monitoring process.

Before a firm decision is taken to commit the appropriations needed for the construction of the Next Step device, the Commission will institute a rigorous independent assessment of the prospects for fusion.

At the end of this programme, the Commission will instruct independent experts to conduct a final evaluation of the results achieved compared with the objectives set out in Annex III to the framework programme (1994-98) and Annex I to the Decision on the programme. The final evaluation report will be forwarded to the Council, the European Parliament and the Economic and Social Committee.

Proposal for a

COUNCIL DECISION

[redacted]

adopting a specific research and technological development programme to be implemented by the Joint Research Centre for the European Atomic Energy Community (1995–98)

(presented by the Commission)

Proposal for a

COUNCIL DECISION

adopting a specific research and technological development programme to be implemented by the Joint Research Centre for the European Atomic Energy Community (1995-98)

(../.../Euratom)

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular Article 7 thereof,

Having regard to the proposal from the Commission submitted after consulting the Scientific and Technical Committee[1],

Having regard to the opinion of the European Parliament [2],

Having regard to the opinion of the Economic and Social Committee [3],

Whereas, by its Decision ../.../Euratom [4], the Council adopted a framework programme of Community activities in the field of research and training (1994-98) including all activities relating to research, technological development, including demonstration projects, international cooperation, the dissemination and exploitation of research results and training in the fields of nuclear fission safety and controlled thermonuclear fusion; whereas this Decision is taken in the light of the grounds set out in the preamble to that Decision;

Whereas Article 2 of Decision ../.../Euratom provides that the framework programme should be implemented by means of specific programmes adopted in accordance with Article 7 of the Treaty;

1) JO No.....of.....p.....
2) JO No.....of.....p.....
3) JO No.....of.....p.....
4) JO No.....of.....p.....

Whereas it is necessary to estimate the funds required for the implementation of this programme on the basis of Article 1, paragraph 3 of Decision..... / ...../ Euratom;

Whereas Decision ...../.../Euratom provides that the maximum overall amount for the framework programme is to be reviewed no later than 30 June 1996 with a view to its being increased; whereas, as a result of that review, the amount deemed necessary for implementation of the programme might increase;

Whereas the content of the framework programme has been defined in accordance with the principle of subsidiarity; whereas this specific programme lays down the content of the activities to be carried out in accordance with that principle;

Whereas the JRC is called upon to contribute to the implementation of the framework programme through activities for which it has special, if not unique, capabilities and installations and by providing the scientific and technical support needed for the formulation and implementation of Community policies and the tasks assigned to the Commission under the Treaty requiring the impartial, independent assistance of the Centre; whereas that contribution should be an integral part of a long-term strategy which will lead to the JRC playing a significant role in the field of European scientific cooperation;

Whereas the direct action carried out by the JRC includes institutional research and scientific and technical support activities;

Whereas, as part of the direct action, the research activities must be carried out in such a way as to ensure their complementarity with the corresponding indirect action;

Whereas, as part of the direct action, the scientific and technical activities to support the Community policies should remain consistent with policy requirements for the duration of the implementation of this programme;

Whereas the JRC may also take part in the indirect action carried out under other specific programmes in the same way as third parties situated in a Member State;

Whereas the JRC may also take part, on a competitive basis, in any other activity implemented by the Community and carry out research on behalf of third parties;

Whereas exploratory research should be encouraged;

Whereas the JRC may contribute to the alignment of national, Community and European research and technological development activities; whereas, closely involved in the formulation and implementation of Community policies, it may, in the scientific and technical sectors in which it has expertise, play a leading role, be a focal point for networks involving public and private laboratories in the Member States and serve as a centre of gravity for European research consortia in specific fields;

Whereas it is desirable, under this programme, to have an evaluation carried out of the economic and social impact and of any technological risks;

Whereas there should be continual and systematic monitoring of progress on the implementation of this programme with a view to adapting it, if necessary, to scientific and technological developments;

Whereas it is necessary to continue widening the scientific and technological basis of European industry in order to foster its international competitiveness; whereas it is therefore necessary to promote the prenormative research activities considered to be necessary under other Community policies;

Whereas it is necessary to strengthen the economic and social cohesion of the Community, and to promote its harmonious overall development, while complying with the objective of scientific and technical excellence; whereas the activities of the JRC should help to achieve these objectives;

Whereas particular attention should be paid to the safety of the nuclear fuel cycle and its impact on the environment;

Whereas it is necessary for the JRC to be better involved in networks and consortia with partners in all of the Member States, in both its institutional and its competitive activities; whereas the JRC should, in particular, play a leading role to improve links between research laboratories and institutions in all regions of the Community;

Whereas, in the field of safeguards, the JRC should contribute to the development of the new technologies needed to ensure, in this area, compliance with the obligations arising from the Treaty;

Whereas the Commission, on the basis in particular of the expertise of the JRC in the field of safeguards, should support the competent authorities of the new independent States in order to set up a coherent, reliable system of safeguards throughout their territories, in particular in order to eliminate any potential source of unlawful trade in nuclear materials;

Whereas, more generally, the Commission should, by making use of the capabilities of the JRC, continue to contribute to the setting up of a coherent, reliable international system of safeguards through its cooperation with the competent international organizations, in particular the IAEA, and with any third countries which also wish to take part in such a system;

Whereas the work and experience of the JRC should be usefully exploited by the Commission in its activities to help the Central and East European countries and the new independent States in the field of nuclear safety and safeguards;

Whereas, in the implementation of this programme, international cooperation activities may, in accordance with Article 101(2) of the Treaty, also prove to be useful with other third countries and international organizations;

Whereas, with this in mind, the JRC should establish preferential links with public and private bodies and undertakings established in third countries, in particular European third countries;

Whereas the JRC may contribute to the dissemination and exploitation of the results of its activities;

Whereas there should be an independent evaluation of progress with the institutional research activities in order to provide all of the background information required for determination of the objectives of the next framework programme; whereas, lastly, it is necessary, under that programme, to carry out a final evaluation of the results obtained in the light of the objectives set out in this Decision;

Whereas the Board of Governors of the JRC plays an important part in the operation of the Centre and in the implementation of its activities;

HAS ADOPTED THIS DECISION:

Article 1

A specific programme concerning the research and technological development activities to be conducted by the Joint Research Centre is hereby adopted for the period from 1 January, 1995 to 31 December, 1998.

Article 2

The Commission, assisted by the Board of Governors of the JRC (hereinafter referred to as the "Board of Governors"), shall be responsible for the implementation of this programme and, to this end, shall call upon the services of the JRC.

Article 3

1. The activities referred to in Article 1 above shall include the institutional research activities and the institutional scientific and technical support activities.
2. The institutional research activities as defined in Annex IA are those for which the JRC has special, if not unique, capabilities and which contribute to the RTD policy of the Union. They shall be implemented in such a way as to ensure their complementarity with the corresponding indirect activities contained in the other programmes under the framework programme.

3. The institutional scientific and technical support activities as defined in Annex IB are the activities needed for the formulation and implementation of other Community policies and the tasks assigned to the Commission under the Treaty requiring the impartial and independent assistance of the JRC.

Article 4

1. The JRC shall participate in the implementation of activities concerning research, technological development, international cooperation, the dissemination and utilization of knowledge gained through research, training in the fields of nuclear safeguards and safety and controlled thermonuclear fusion by implementing the direct action and by means of its exploratory research activities.

2. It shall also contribute to the implementation of the Community research, technological development and demonstration activity by means of its participation in the indirect action implemented under the other specific programmes by cooperating with one or more partners situated in a Member State.

3. Lastly, the JRC shall participate in the implementation of Community research, technological development and demonstration activity through its involvement in networks or consortia with partners in all of the Member States. It shall in particular make every effort to improve links between research laboratories and institutions in all regions of the Community.

Article 5

1. The amount deemed necessary for carrying out the activities of the JRC is ECU 300 million.

2. An indicative breakdown of this amount is given in Annex II.

3. The amount deemed necessary, as indicated above, for carrying out the programme may increase as a consequence of and in conformity with the Decision referred to in Article 1, paragraph 3 of Decision ...../.../Euratom.

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the scientific and technological priorities set in the framework programme.

Article 6

The detailed rules for the implementation of this programme are set out in Annex III.

Article 7

1. The Commission, assisted by the Board of Governors, shall continuously and systematically monitor progress with this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate to the changing situations. It shall, if appropriate, submit proposals to adapt or supplement these programmes depending on the results of the monitoring process and, with regard to the activities for the scientific and technical support of Community policies, shall take the necessary action to ensure that these are consistent with the requirements of these policies.

2. The Commission shall each year before 15 April submit to the European Parliament, the Council and the Economic and Social Committee a report on the implementation of this Decision. This report shall be accompanied by the observations of the Board of Governors. The latter may also, through the Commission, submit to the European Parliament, the Council and the Economic and Social Committee a separate report on any aspect of the implementation of this Decision.

3. In order to contribute to the overall evaluation of the Community activities provided for in Article 4.2 of the Decision adopting the framework programme, the Commission, after consulting the Board of Governors, shall instruct independent experts to carry out an evaluation of the research activities and their management covered by this programme.

4. At the end of this programme, the Commission, after consulting the Board of Governors, shall instruct independent experts to conduct a final evaluation of the results achieved compared with the objectives set out in Annex III to the framework programme and Annex I to this Decision. The final evaluation report shall be forwarded to the Council, the European Parliament and the Economic and Social Committee.

Article 8

The Commission shall ensure, in cooperation with the Board of Governors, that there is systematic consultation with the programme committees concerned in order to ensure close coordination between the indirect action, the corresponding national activities and the institutional research activities of the JRC in the same fields and to guarantee a coherent approach.

Article 9

1. The Commission is authorized, in accordance with Article 101 (2) of the Treaty, to negotiate international agreements, in particular with European third countries and with international organizations situated in Europe, with a view to associating them with JRC activities.

2. The Commission, assisted by the Board of Governors, may, on the basis of the criterion of mutual benefit, request the JRC to execute projects with bodies and undertakings established in third countries, in particular European third countries, in the context of the specific programmes carried out by the JRC.

Article 10

This Decision is addressed to the Member States.

Done at..... on.....

For the Council

Annex I

Scientific and technological objectives and contents

This specific programme fully reflects the broad lines of the fourth framework programme, applies the selection criteria and spells out the scientific and technical objectives set out in that programme.

Annex III of the framework programme constitutes the basis of the objectives of this programme.

The Joint Research Centre (JRC) will conduct strategic and applied research. It will be carried out as an integral part of the European science and technology system and should also contribute to the scientific foundation of the various Community policies. It will be based on:

- scientific and technical excellence,
- impartiality and independence,
- unique research facilities,
- openness to all Member States.

In line with the priorities defined in the White Paper "Growth, Competitivity, Employment" the scientific and technical activities carried out by the JRC should meet the needs of the Community as a whole, its institutions and Member States with the objectives of:

- helping to strengthen the scientific and technological basis of European industry and to encourage the development of its international competitiveness;
- providing the independent scientific expertise necessary for the implementation of Community policies and the tasks which the Treaty assigns to the Commission;
- providing scientific and technical services to Community institutions and making JRC capabilities and scientific and technical installations available to public and private bodies;
- contributing to the improvement of public safety aspects of new technologies;
- contributing to the improvement of environmental impact assessment and protection;
- contributing to the reduction of scientific and technological disparities between Member States.

The European dimension of its work must remain one of the fundamental strengths of the JRC. Its activity should be characterized by a multidisciplinary approach based on the broad span of its capabilities. This multidisciplinarity will be reflected in the subjects developed by its institutes, thus ensuring its ability to meet new challenges as they arise.

Thanks to its capabilities and its involvement in the formulation and implementation of Community policies, the JRC will contribute to the integration of national, Community and European activities. Thus it will participate in networks of public and private laboratories in the Member States or European research consortia, and may be the focal point of such networks in its areas of expertise.

This large exposure should not, however, lead to an excessive dispersion of the activities undertaken. Without ignoring the expectations of its customers, the Centre and its management must have clear views on the proper scientific and technical policy for the JRC and be able to maintain a balance in order to ensure that the activities and contracts which are accepted can be executed at all times with the requisite level of competence, both qualitatively and quantitatively.

The research to be conducted by the JRC falls into two categories:

- institutional research activities,
- institutional activities for the scientific and technical support of Community policies.

*
* *

A. INSTITUTIONAL RESEARCH ACTIVITIES

These research, training and demonstration activities for which the JRC has capabilities and installations which are special, if not unique, in the Community contribute to the implementation of Community research policy.

• Safety of nuclear fission

The objective is to increase scientific and technical knowledge and to contribute to the development of technologies aimed at improving the safety of the whole of the nuclear cycle and reducing the environmental impact of the use of nuclear energy, and to respond to the need to assume the responsibilities of the Community arising from implementation of the Treaty.

The JRC contribution will be in the following fields:

- reactor safety,
- fuel cycle safety,
- safeguards and fissile materials management.

Reactor safety

JRC research will be focused mainly on the following areas:

- a contribution to accident prevention: the development of non-destructive analytical techniques (NDA) for the improvement and refinement of inspection procedures and the development of qualification methodologies to facilitate their harmonization;
- probabilistic safety studies: the JRC will contribute to the improvement of methodologies and to the emergence of a consensus on their implementation in safety studies;
- studies conducted through European networks into the mechanisms of component ageing, a method of attenuation, evaluation of the integrity of structures and inspection possibilities;
- studies of serious accidents: these studies will be conducted, on the one hand, through studies of the internal and external phenomena in the containment in experiments with degradation of the reactor core using real materials and operating at a real temperature; these operations will be carried out on a small and a large scale at the JRC and, on the other hand, through a contribution to the study of the release of fission products and the transfer phenomena by participation in the interpretation of the results of experiments simulating accidental releases conducted in other laboratories, in particular the CEA (study of the source-term) and by carrying out aerosol resuspension tests at the JRC. They will be carried out in conjunction with the activities in this field foreseen under indirect actions.

This research will continue to be the subject of a major cooperation effort within the framework of the networks involving European and non-European partners. It is aimed in particular at the development of common design tools intended for industry and the authorities responsible for safeguards.

It will make extensive use of the JRC's ability to set up cooperation networks between the European partners concerned and thus to participate in the implementation of the Community policy provided for in the Treaty.

Fuel cycle safety

The main objective of the studies conducted by the JRC is to reduce the environmental impact of using nuclear energy by means of research into the fuel cycle permitting optimized management of the end of the cycle. They will be conducted in close co-operation with the activities in this field foreseen under indirect actions.

This research will be aimed at improving the understanding of actinides and the plutonium cycle and drawing up the best possible waste management strategy, in particular by minimizing the production of high-level waste. It will take account of changes in reactor design.

It will also be aimed at supporting the Member States' current strategy of deep burial of radioactive waste and exploring management strategies which would make it possible to reduce the amount of waste produced by future fuel-cycle installations. This research will be conducted in close cooperation with national laboratories.

The subjects covered will include:

- studies of the safety of the behaviour of nuclear fuels (UO_2 and mixed oxide),
- study of fundamental and solid-state physico-chemical analyses of actinides,
- study of nuclear aerosols,
- minimization of secondary actinides and other radionucleides with long half-lives in the nuclear fuel cycle,
- plutonium fuel technology,
- characterisation of spent fuel with a view to its elimination,
- radionucleides for medical applications.

Safeguards and fissile materials management

The research conducted at the JRC is aimed at obtaining, in good time, results or new techniques implementation of which is necessary for compliance with obligations arising from safeguards provided for in the Treaty and the Non-Proliferation Treaty.

It is necessary in particular to develop new techniques to meet the new challenges related to the development of the fuel cycle and the strengthening of the control systems.

These activities are aimed at the development and improvement of techniques including:

- non-destructive test techniques using gamma and neutron radiation for the analysis of waste, production waste and irradiated fuel;
- measurements relating to volume and weight in large tanks in fuel production and reprocessing plants;
- sealing techniques and new marking systems for objects containing nuclear materials and for containers;
- surveillance systems using the storage and processing of digital images for automatic surveillance and examination and for improvement of recordings in the long term without inspectors.

A particular effort will be devoted to research on the design of multisensoral integrated systems able to function in the absence of inspectors by using mobile robotic technology. These systems will use intelligent software for the production of data and the compatibility of materials.

These activities will be conducted in particular using the experimental installations Perla ("Performance and training laboratory"), Tame ("Tank measurement") and Lasco ("Surveillance and containment") of the JRC which offer experimental conditions which are representative of reality in an installation.

Lastly, the JRC research in the field of safeguards also forms part of a process of European cooperation as illustrated by the ESARDA network ("European Safeguards Research and Development Association") and international cooperation with the USA, Canada, Japan and Russia.

- **Controlled nuclear fusion**

This activity forms part of the Community fusion research programme. It is aimed at improving the pool of knowledge and the technology of the "safety and environment" dimension of future machines intended for the European programme. The bulk of the work will be dedicated to support for the International Thermonuclear Experimental Reactor (ITER) but may also involve any other fusion reactor.

For this purpose, the JRC has designed and constructed the European Tritium Handling Laboratory (ETHEL). The aim of this installation is the development of methods of handling tritium, but special attention will be paid to the verification and validation of methods of preventing and reducing tritium and activation product waste in the work area and the environment under both normal and accident conditions.

The laboratory is also able to offer research capability to any other European organization which is a member of the Community fusion programme or is associated with it.

Part of the activities will concern the development and characterization of materials to meet the following requirements: good compatibility with tritium, behaviour as effective barriers against infiltration of tritium with low induced radioactivity. The JRC, which has long experience in this field, will make a significant contribution within the framework of the ITER and for the longer term requirements of the Fusion Programme.

In addition to these activities, more general studies, including operational safety during maintenance, will be conducted by the JRC in line with specific demands relating to the ITER project or, more broadly, the Fusion Programme, in particular studies on low-activation materials and remote handling.

B. INSTITUTIONAL SCIENTIFIC AND TECHNICAL SUPPORT ACTIVITIES

These activities are necessary for the formulation and implementation of Community policies and tasks assigned to the Commission under the Treaty.

The following description, which is based on current Community policy requirements, is given by way of guidance and may be modified in accordance with the relevant provisions of Article 7, paragraph 1.

Nuclear fission safety - Reactor safety

The aim of this activity is to meet specific demands with regard to the promotion and harmonization of reactor safety criteria, and demands relating to Community activities concerning the safety of nuclear plants in the countries of Central and Eastern Europe and the republics of the former USSR.

These demands in particular concern:

- serious accidents: safety requirements and evaluation, management strategy;
- probabilistic studies for safety evaluation;
- component ageing mechanisms and the development of a qualification methodology.

Safeguards

The objective is to provide scientific and technical support for the implementation of safeguards in accordance with the Euratom Treaty and similar support to the IAEA in the context of the implementation of the safeguard agreements between the Agency, the Community and the Member States and implementation of the Non-Proliferation Treaty.

The fields covered by support for the Community include:

- the development and operation of on-site laboratories to carry out analyses in connection with checks in certain major fuel-cycle installations in the Member States (communication from the Commission to the Council and to Parliament of 24 March 1992);
- analyses of safeguards samples (European Commission's Safeguards Analytical Measurements - ECSAM) as part of a network operated by the JRC;
- non-destructive tests, inspection of tanks, development and calibration of instrumentation and measurement systems;
- development of sealing technologies for fuels and containers and identification and surveillance techniques;
- development of integrated surveillance systems not needing the presence of inspectors and of computerized systems for nuclear materials compatibility and the management of data bases;
- analysis of nuclear materials being unlawfully transported in the Community and seized by the national authorities;
- training of Euratom inspectors in all of the above techniques and support in terms of health protection.

The support for the IAEA will in particular cover:

- analytical measurement and surveillance techniques for tanks, including the development and calibration of instrumentation for inspectors and the operation of an international network for the quality assurance of control measures;
- non-destructive techniques, including tests and calibration of methods and instrumentation and the development of the associated software to meet the requirements of the Agency inspectors;

- development of sealing techniques for the dry storage of irradiated fuel, its transportation and its storage in containers;

- development of surveillance techniques for the verification of information on the design of nuclear installations;

- development of integrated systems of measurement;

- study of new techniques to strengthen the international controls carried out by the Agency;

- training of inspectors and operators.

These support activities will make use of the specialized experimental installations available in several JRC establishments (Geel, Ispra and Karlsruhe).

Annex II

Indicative breakdown of the amount

ENERGY	ECU million
Nuclear fission safety	254
Controlled thermonuclear fusion	46
Total	300(1)(2)

(1) This total includes an amount equivalent to 6% which may be allocated to exploratory research

(2) This total also includes the JRC's budget contribution necessary for its participation in shared cost actions.

Annex III

Detailed rules for implementing the programme and activities for dissemination and exploitation of the results

1. The Commission, assisted by the Board of Governors of the JRC, shall implement this programme on the basis of the scientific objectives and contents described in Annex I. The activities relating to this shall be conducted by the competent institutes of the Joint Research Centre (JRC).

2. The detailed rules for implementing this programme, as referred to in Article 6, comprise research and technological development projects, scientific and technological support needed for the preparation and implementation of Community policies and the tasks assigned to the Commission under the Treaty and requiring the impartial, independent assistance of the JRC, and accompanying measures.

3. The institutes of the JRC shall endeavour, wherever possible, to carry out research in cooperation, preferably on the basis of networks, with the national research bodies in the Member States. Particular attention shall be paid to cooperation with industry, especially with small and medium-sized enterprises. Research bodies established in third countries may also cooperate on projects in accordance with the relevant provisions.

Research projects as part of international cooperation under the conditions set out in the previous paragraph include cooperation with research laboratories and the exchange of scientists. Supplementary measures should allow for cooperation with research laboratories and institutes in the countries of Central and Eastern Europe.

4. The accompanying measures shall include:

- the organization of visits to JRC institutes of grantholders, visiting scientists and seconded experts,

- organization of the detachment of JRC scientists to national laboratories, industrial laboratories and universities,

- the organization of scientific seminars, workshops and colloquiums,

- specialized training activities, with the emphasis on multidisciplinarity,

- training in the field of safeguards and the management of fissile materials, in particular for nationals of the former USSR, subject to the allocation of short-term grants,

- an information exchange system,

- promotion of the exploitation of the research results,

- the independent scientific and strategic evaluation of the performance of the projects and programmes.

FINANCIAL STATEMENT

1. TITLE OF OPERATION

Specific research and technological development programme to be implemented by the Joint Research Centre for the European Atomic Energy Agency (1995-1998).

2. BUDGET LINES CONCERNED

Articles	B6-111:	Staff (in part),
	B6-121	Resources (in part),
	B6-3	Direct operating appropriations.

3. LEGAL BASIS

- Treaty establishing the European Atomic Energy Community, and in particular Articles 7 and 8 thereof;

- Council Decision ...../...../EURATOM concerning a framework programme of Community activities in the field of research and training for the European Atomic Energy Community (1994-98).

4. DESCRIPTION OF OPERATION

4.1 General objectives of the operation

In the framework of the broad lines set out in the fourth framework programme, as referred to in point 3 above, the activities to be conducted by the JRC will meet the following objectives:

- to provide a specific contribution to the implementation of Community research and technological development policy, and

- to provide support for the implementation of other Community policies through research activities.

It is planned that the JRC will contribute to the implementation of the first area of activity under the fourth framework programme. The scientific and technical content of the proposed activities, as far as the subject matter is concerned, can be summarised as follows:

- Nuclear fission safety: research on safeguards, the safety of the fuel cycle and reactor safety. Scientific and technical support for safeguards within the framework of Euratom and the IAEA.

- Controlled thermonuclear fusion: research focussing on the aspects of safety and the environment (use of the tritium laboratory) and on activities within the framework of the quadripartite ITER international agreement (materials and remote handling).

It is also planned for the JRC to participate in indirect activities:
Appropriations covering the proportion which is the responsibility of the JRC in its participation in the indirect activities.

4.2 **Duration**

1995-1998

4.3 **Target population**

The international scientific community.

5. **CLASSIFICATION OF EXPENDITURE AND REVENUE**

5.1 Non-compulsory expenditure

5.2 Differentiated appropriations

6. **TYPE OF EXPENDITURE OR REVENUE**

Appropriations intended to cover the various resources, set out in point 2 above, used to carry out the research activities as referred to in point 4.
In principle, the research activities carried out by the Joint Research Centre will be 100% funded from Community own resources.

7. **FINANCIAL IMPACT**

7.1 **Method of calculating total cost of operation**

The total cost of the proposed programme is as provided for the JRC in the proposal for a framework programme for 1994-1998 referred to in point 3 above. This amount covers all scientific, technical and exploitation activities and expenditure in respect of the various sites and infrastructure of the JRC institutes. The breakdown of the overall amount between the various activities, as set out in point 7.2 below, has been made taking account of the following:

- a forecast of staff expenditure based on the medium-term economic development in the Member States which host the various sites of the Joint Research Centre;

- a forecast of general and scientific and technical support expenditure under the same conditions;

- an evaluation of the operating appropriations required to carry out the research programmes (direct expenditure for operation, equipment and contracts);

- consideration of an amount of ECU 16 million, corresponding to JRC participation in indirect activities carried out under other specific programmes, in association with partners in the Member States. *(The use of these appropriations is dependent on the participation of the JRC in the indirect activities carried out under other specific programmes on the same terms as third parties situated in an associated State.)*

7.2 Itemised breakdown of cost

The breakdown between subjects of the framework programme is given, for guidance, in the table below:

In million ECU at current prices

Breakdown	1995	1996	1997	1998	TOTAL
Fission	64.53	61.00	57.00	55.47	238.00
Controlled thermonuclear fusion	10.85	11.00	12.00	12.15	46.00
Sub-total	**75.38**	**72.00**	**69.00**	**67.62**	**284.00**
Participation in indirect activities	1.00	3.00	6.00	6.00	16.00
TOTAL	**76.38**	**75.00**	**75.00**	**73.62**	**300.00**

7.3 Indicative schedule of appropriations

The schedule will be established on the basis of the overall amounts for the fourth framework programme adopted indicatively for the periods 1995-1996 and 1997-1998 at the conciliation meeting on 21 March 1994. The RTD appropriations for each financial year will be proposed and adopted each year on the basis of the resources available in the context of the financial perspective.

Period of application: 1995-1998

In million ECU at current prices

Commitment appropriations		Payment appropriations				
		1995	1996	1997	1998 on	TOTAL
1995	76.38	65.52	9.00	1.56	0.30	**76.38**
1996	75.00		66.00	7.44	1.56	**75.00**
1997	75.00			66.00	9.00	**75.00**
1998	73.62				73.62	**73.62**
TOTAL	**300.00**	**65.52**	**75.00**	**75.00**	**84.48**	**300.00**

8. WHAT ANTI-FRAUD MEASURES ARE PLANNED?

Internal audit and control programme in respect of the scientific and budgetary aspects to be carried out by the JRC staff responsible and periodic verifications to be carried out by the JRC Board of Governors and its evaluation committees.

9. ELEMENTS OF COST-EFFECTIVENESS AND ANALYSIS

9.1 Specific, quantifiable objectives and target population

The JRC programme forms part of the framework programme which corresponds to the objectives set out in Articles 7 and 8 of the Euratom Treaty.

The participation of the JRC in the fields of action covered by this proposal is in keeping with the capabilities and attributes of the JRC and complies with the principle of subsidiarity.

The target population is the European scientific and industrial population and those concerned with the various sectoral policies of the Commission in which the JRC is required to participate.

9.2 Grounds for the operation

The operation is justified by the need for the Community to strengthen the scientific and technological bases of European industry and to encourage it to become competitive at international level, while contributing to the implementation of Community policies and meeting the needs of society.

The consequences for research of the central role which the principle of subsidiarity plays in Community action pursuant to decisions relating to the Euratom Treaty have been analysed. This has revealed a number of specimen cases to which the principle of subsidiarity inherently applies: advanced scientific activities, projects with technological priority, RTD activities relating to the single market, prenormative research and support activities for the sectoral policies with which the Commission considers it would be useful to associate the JRC in view of its capabilities.

9.3 Monitoring and evaluation of the operation

- The nature of the internal evaluation and the intervals at which it is to be carried out should enable the Commission to meet the requirements incumbent upon it.

- Application of the supplier/customer principle to the JRC's R&D activities will guarantee optimum utilisation of the resources allocated to them.

- All JRC activities are the subject of annual work schedules which are submitted to the Board of Governors of the JRC for approval. These indicate the progress of the various R&D projects.

- The quantitative and qualitative indicators and criteria for evaluation of the results of the programme will be determined for each subject of activity.

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