

# COMMISSION OF THE EUROPEAN COMMUNITIES

COM(91) 281 final - SYN 352

Brussels, 22 July 1991

## COMMUNICATION FROM THE COMMISSION TO THE COUNCIL

relating to a COUNCIL RESOLUTION  
concerning activities to be undertaken by the  
Joint Research Centre (JRC)

-----

Proposal for a

### COUNCIL DECISION

- SYN 352

adopting specific research programmes to be  
implemented by the Joint Research Centre  
for the European Economic Community (1992-1994)

-----

Proposal for a

### COUNCIL DECISION

adopting specific research programmes to be  
implemented by the Joint Research Centre for the  
European Atomic Energy Community (1992-1994)

-----

Proposal for a

### COUNCIL DECISION

adopting a supplementary research programme to be  
implemented by the Joint Research Centre for the  
European Atomic Energy Community

-----

(presented by the Commission)

# **JRC PROGRAMME PROPOSAL**

**1992 - 1994**

- I. INTRODUCTION - SCIENTIFIC OBJECTIVES**
- II. ORGANISATION AND RESOURCES**
- III. PROPOSALS FOR COUNCIL RESOLUTION  
AND DECISIONS**

- **Technical Annex: Scientific-Technical Work  
(Institute by Institute)**
- **Financial Statements**
- **Statement of Impact on Competitiveness  
and Employment**

## **CHAPTER I**

# **INTRODUCTION - SCIENTIFIC OBJECTIVES**

## **INTRODUCTION**

1. This document contains the proposal of the Commission for the activities to be undertaken by the JRC (Joint Research Centre) during the period 1992-1994.
2. In 1988, following an in-depth examination of the JRC by a panel of Senior Industrialists, the Commission engaged in a major restructuration of the JRC and since that period, with the approval of the Council<sup>1</sup> and the Parliament<sup>2</sup> the JRC has undertaken four distinct types of activity:
  - specific research programmes under the Framework Programme<sup>3</sup>;
  - scientific and technical work in support of other services of the Commission;
  - contractual work for external third parties;
  - exploratory research.
3. For the future, it is proposed to pursue these four types of activity and whilst only specific research programmes under the Framework Programme and the Euratom supplementary programme for the exploitation of the HFR reactor (contributing to the activity Contractual Work for External Third Parties) require Council Decisions under the relevant Treaties' procedures, it appears opportune that the Commission's proposals for such decisions be inserted in a general framework describing how the JRC intends to operate as a whole; for that purpose, and in the same way as in 1988, the overall activities of the JRC should be the object of a Council Resolution.
4. Having set the restructuration well under way, the Commission wishes to adopt a long-term view on the role of the JRC in the European Community and its proposal for the period 1992-1994, synchronised with the Third Framework Programme, has been established within the frame of a longer-term strategy to the year 2000. This strategy will be summarized in the next section of this document.
5. In terms of the operations of the JRC, the most significant feature has been the reorganisation into Institutes which have become the backbone of the new system; hence, the detailed presentation of JRC overall activities for 1992-1994 will be made in the Technical Annex on an Institute by Institute basis.

## **ACHIEVEMENTS SINCE 1988**

6. The proposals for the period 1992-1994 are firmly based on an in-depth analysis of the current achievements of the JRC compared to the specific objectives set for it by Council in 1988. In particular, they take into account the status of work in progress and which has been reported in the successive JRC Annual Reports for the years 1988, 1989 and 1990.
  - (1) see Council Resolution of 29. 1988 No 88/C 197/03 in OJ No C 197/4.
  - (2) see Legislative Resolution embodying the Opinion of the European Parliament in OJ No C/94/31, 11.4.1988, p. 74
  - (3) see Council Decisions of 14. 10. 1988 No 88/521/EEC in OJ No L 286/29 and No 88/522/Euratom in OJ No L 286/33.

7. Furthermore, they also take into account the guidance received from the evaluation carried out at mid-programme by a high level panel of independent experts, led by Dr. Harry Beckers of Shell International. This evaluation was performed under the terms of the Council Decisions on the 1988-1991 Programme and, accompanied by the observations of the Board of Governors, was presented by the Commission to the Council and European Parliament on 16th January 1990. It gave rise to long term strategic planning for the JRC and a streamlining of its internal structure, notably by the merging of two of the Institutes into the Institute for Systems Engineering and Informatics. The panel recommendations also led to an extension and intensification of the customer/contractor principle, both with regard to the support for Commission activities and to relations between the JRC Institutes and the JRC's general services. Finally, where Commission or Community regulations are concerned, additional flexibility in the administrative procedures was introduced, particularly in respect of recruitment.
8. As required by the Council Decisions, a final overall evaluation will be undertaken at the end of 1991 to determine progress during the period since 1988. In particular, this will assess the scientific, technical and economic results of the research undertaken with specific reference to the objectives set by the Council in 1988, and also the cost-effectiveness of the JRC's activities, taking into account the impact of the administrative and financial restructuration which has been implemented since 1988. In agreement with the Board of Governors an evaluation panel has already been nominated, and it is chaired by Sir Hermann Bondi, FRS.

#### **WHAT STRATEGY FOR THE JRC UP TO THE YEAR 2000 ?**

9. The Commission considers that the remit of the JRC for the years to come should be to conduct basic/strategic and applied/target oriented research as an integral part of the European Science and Technology system. It should follow the basic principles of customer/contractor and subsidiarity with the following characteristics:
  - scientific and technical excellence;
  - neutrality and independence;
  - unique research facilities;
  - openness to all Community Member States.

The basic and applied research in science and technology carried out by the JRC should meet the needs of the Community as a whole, its Institutions and Member States with the objectives of:

- contributing to the strengthening of the scientific and technological basis for European industry and to the development of its international competitiveness;
- contributing to the enhancement of the quality of the human and natural environment;
- contributing to the improvement of public safety aspects of new technologies;
- contributing to the reduction of scientific and technological disparities between the Member States of the Community;

- providing scientific and technical services to Community Institutions, and making JRC competences and scientific and technical installations available to public and private bodies.
10. Whatever form is adopted for the JRC in the long-term, it is considered that its distinctive Community character must be preserved. The structure should be dictated by the allotted tasks and the Centre must maintain its institutional role of providing scientific and technical support for the implementation of Community policies, while continuing to be open to the outside. In all cases, the JRC should remain an integral component of European R&D policy and this is fully reflected in the present Proposal.

#### **JRC TASKS GUIDED BY THE MARKETPLACE**

11. Bearing in mind that the Centre is driven by the needs of its marketplace, having to take account of the subsidiarity principle and develop its particular actions under the application of the customer/contractor principle, long-lasting criteria for the JRC contributions to Community policies may be established:
- performing research where the specific Community nature of the Centre is an advantage, either because of its independence of judgment and neutrality or because of the close links with the Commission's Directorates-General responsible for implementing Community policies. This applies primarily to research of a regulatory or pre-normative nature or of public utility, and it is here that the institutional role of the JRC appears most clearly;
  - performing research of the scientific watch type or of a conservative type -to maintain scientific competences in areas which may present a potential for development or which may return to importance at a later stage- where there is an advantage in concentrating at a central point in the Community specialised research with a long-term interest or a high risk element. Recognised scientific-technical competence is an essential condition to justify the concentration of research at the JRC;
  - serving as a focal point for research on cross-frontier problems in which the JRC, through integrated operations bringing together its own research and the work of industrial or national laboratories, contribute to the European effort towards excellence and cohesion between Member States of the Community and acts as a bridge between groups of Member States presenting different levels of scientific and technical development;
  - contributing to establishing links with the EFTA and other European countries, notably the Central and Eastern countries;
  - linked with the above activities, the JRC may contribute in selected areas where it has strong competences, to the management of shared cost actions and similar schemes;
  - external dimensions of the JRC activities assign a role for the Centre as a continuing active partner in selected EUREKA projects and as a contributor to Commission actions related to international cooperation of a more global dimension;

- providing specialised training in research. This is not a mere continuation of the current traditional fellowship scheme (sectoral scientific-technical grants), but a visualisation of the JRC with a permanent role through its planned contributions to the human capital and mobility objective as opened up in the Third Framework Programme, and thereby provide its contributions to the creation of a true scientific and technological society in Europe;
- through activities carried out in association or through specific work under contract, providing industry, national public bodies and others, including the European Environment Agency with specific expertise and facilities developed in the course of research;
- specialized and costly installations developed by the JRC and whose duplication at a national or commercial level would not be justified will, in addition to their use in JRC programmes, be placed at the disposal of other organizations, either in collaboration agreements or under contractual arrangements with public or private bodies.

### **MULTIDISCIPLINARY CHARACTER OF THE CENTRE**

12. A fundamental strength of the JRC, which is the basis of its remit, is the European dimension of its work. This is not limited to scientific-technical activities in a few scientific disciplines. Indeed, a second strength is the multidisciplinary character of the Centre where the span of competences and skills - admittedly to a varying degree - stretches over many sciences. The JRC has a strong tradition of executing projects of a multidisciplinary nature. This multidisciplinary nature is indeed reflected in the subject areas of most of the Institutes and promises that, in the future, the JRC will also be able to take up new challenges as needs arise based on the flexibility required of a European laboratory. Consequently, multidisciplinary should be cultivated for the future.

On the other hand, this should not lead to a complete dispersion of the activities which are undertaken. While remaining customer-driven, the Centre and its management must have clear views on the proper scientific-technical orientations for the JRC and be able to keep a balance in order to ensure that the activities and contracts which are accepted can be executed at any time with the requisite level of competence, qualitatively as well as quantitatively.

### **JRC SCIENTIFIC AND TECHNOLOGICAL ACTIVITIES**

13. As noted in section 2 of this document, the Council Resolution of 29 June 1988 specified the first of the activities of the JRC, its predominant task for the period 1988 to 1991, the "implementation of the Framework Programme by means of specific programmes and preparatory research". This definition still holds good for the 1992-1994 period and is the subject of the proposals presented herein.

The work is oriented towards meeting the overall objectives of the Framework Programme and those set out for the particular lines of the Framework Programme to which the JRC contributes, or in more detail, to the objectives of specific research programmes whose execution is entrusted to the JRC. While the JRC Board of Governors remains the proper guardian

of the JRC and its work, and sees that JRC research constantly evolves towards the objectives set out, a close coordination will be maintained with the relevant shared cost action programmes, notably through a full and detailed exchange of information with their respective committees on the JRC research in those areas.

### **SPECIFIC PROGRAMMES**

14. The JRC will contribute to the objectives of the Third Framework Programme through the following lines:

- ***Industrial and Materials Technologies;***
- ***Measurement and Testing;***
- ***Environment;***
- ***Nuclear Fission Safety;***
- ***Controlled Nuclear Fusion;***
- ***Human Capital and Mobility.***

The broad objectives of the JRC contribution to these lines are set out below. More detailed descriptions are provided in the Technical Annex.

15. In the field of **Industrial and Materials Technologies** the planned JRC contribution concerns:

- ***Working Environment and***
- ***Materials.***

With regard to ***Working Environment***, while keeping in mind the normal application of the subsidiarity principle, an important project selection criterion will be the orientation towards prenormative research. The Community will be called upon for further regulatory actions in areas such as health care and risk control, setting upper and lower limits (e.g. toxicology), standard evaluation methods and procedures for analysis, evaluation of risks to workers, and evaluation of the working environment in relation to the introduction of new technologies. Research should furthermore evolve in close collaboration with relevant national bodies in the Member States, and with the coming European Agency for Safety at Work.

Consequently the JRC has selected the following research themes which match existing JRC skills, with the objective of actively contributing to this work:

- ***Toxicology and Occupational Health;***
- ***Occupational Accident Research and***
- ***Risk Prevention.***



With regard to **Materials**, research will be oriented towards the following areas which all have a strong prenormative dimension and represent important enabling technologies for a whole range of advanced industrial applications:

- *Alloys and Intermetallics;*
- *Ceramics and Composites;*
- *Coatings and Processing;*
- *Surface Modification Technology;*
- *New Functional Materials;*
- *Non Destructive and Evaluation Techniques for Advanced Materials and Components;*
- *Information and Data Management.*

These projects have the objective of helping to ensure that Community manufacturing industry has better access to a range of cost-effective, well-characterized advanced materials and that these materials are incorporated into high performance components. The activity also provides a focal point for the exchange of information on prenormative research on advanced materials. The research supported by unique facilities at the JRC will be conducted in close contact with manufacturing and user industries and furthermore aim at supporting wider European and International standardisation efforts in the vast field of new materials.

16. In the field of **Measurement and Testing**, the essential contribution of the JRC is the continuation of activities in both the nuclear and non-nuclear fields of Reference Materials and Measurements carried out by the Central Bureau for Nuclear Measurements, notably in the following areas:

- *Preparation, Characterization and Certification of Samples;*
- *Long-lived or Stable Isotope Mass Spectrometry;*
- *Nuclear Data Measurements and Evaluation;*
- *Radionuclide Metrology;*
- *Applied Radiation Techniques.*

Research also in the growing application of these specialized techniques to non-nuclear areas will capitalize on the existing experimental facilities including the particle accelerators. Furthermore, specific prenormative research activities will be continued in the fields of Reliability of Structures and on a lesser scale in renewable Energies (Photovoltaic); the latter activity being centred around the utilisation of the existing European Solar Test Installation (ESTI). *Research and Reliability of Structures* will be refocussed on the use of the new Reaction Wall facility. This installation is unique in Europe, fully complementary with other means of research in Member States, and a multinational programme for its utilisation has been agreed.

Other significant activities with national participation are performed in the areas of life prediction of structures and the evaluation of their lifetime in service.

Seen as a whole, these activities are related to the IRDAC initiative to trigger enhanced community research in prenormative fields.

17. In the field of ***Environment***, JRC contributions supporting the implementation of Community environment policy are envisaged in three areas:

- Participation in ***Global Change*** Programmes;
- ***Technologies and Engineering for the Environment*** and
- ***Research on Economic and Social Aspects***.

In the ***Global Change*** area, emphasis will be placed on a strong cooperation with laboratories and institutes in the Member States and at the international level, the JRC contribution will mainly concern:

- ***Modelling and Air Pollution Transport***;
- ***Air Chemistry linked notably to the fate of biogenic and anthropogenic emissions***;
- ***Biosphere-Atmosphere Interaction***;
- ***Related applications of remote sensing which will focus on the interactions between land and ocean surface parameters and climate. It is furthermore aimed towards the development of remote sensing methods applied to critical components of global change.***

Activities under the heading of ***Technologies and Engineering for the Environment*** will mainly concern:

- ***Environmental Chemicals*** (migration and transformation in soil and their impact on ground water, harmonization of analytical methods for water analysis, development of a mobile laboratory for in field analysis of contaminants in soil and water, characterization of algal-blooms, biomonitoring of environmental chemicals, trace metal exposures and human diseases, risk evaluation of environmental chemicals); these activities will notably be aligned towards chemical waste problems;
- ***The further development of techniques and systems to protect the environment, more specifically, systems to prevent or mitigate process and equipment failures in the chemical and process industry***;
- ***Environmental monitoring through remote sensing focussing on advanced techniques.***

A major concentration of new and existing contributions by the JRC to the field of environment should be achieved by establishing within the JRC, together with the European Space Agency (ESA), a Centre for Earth Observation (CEO). The JRC part of the Centre will be set up through active collaboration between the relevant Institutes, i.e. the Institute for Remote Sensing Applications, the Institute for Systems Engineering and Informatics and the Environment Institute.

The main objective of this Centre will be to provide an effective network for the full exploitation of the earth observation data including that obtained by spaceborne sensors. Its activities would include archiving, processing, validation and standardization of global environmental data. The work would be undertaken in collaboration with the ESA and national organisations and would help to provide adequate and timely information on the state of the environment as needed, by the European Environment Agency for example. The establishment of the Centre would require a series of preparatory phases beginning in 1992 and completed with prototype implementations in 1993-1994 aiming at full operation in the following programme period. During the preparatory phases 1992-1994 of the CEO, the Institutes could contribute to prototype studies based on thematic applications (e.g. ongoing projects like TREES, OCEAN and MARS: Monitoring Agriculture with Remote Sensing) in order to fully test the requirements for CEO.

**Research on Economic and Social Aspects** will relate essentially to risk management and conventional industrial safety such as the development of decision support systems for plant safety, plant emergency management and territorial risk management.

The existing work on *Reliability, Risk Assessment and Accident Management* will be strengthened.

Considering the interdisciplinary character of safety-related problems and the research required for their solution, the above work together with other related research work, should give rise to the establishment, within the JRC, of a European Office for Safety which would act via executive centres such as:

- a Centre for Accident Analysis focussing its attention on the development and verification of reference calculation tools in those areas where the complexity and nature of events to be analysed demand an harmonized approach in the Community countries;
- a Structural Integrity Centre which would address the accident prevention issue in the following areas: validation and further improvement of construction norms and standards, structural diagnostic and reliability and validation and harmonization of inspection procedures;
- an Accident Management Centre which should provide response/rescue organizations with information and research results quickly available to help in an actual emergency; plus the data acquisition and management to facilitate post-accident analysis and mitigation. One area of particular concern should be the transportation of hazardous material.

In addition to research, development and support, the Office would provide education and training in each of the above areas and establish data collection, interpretation and distribution facilities where necessary.

When established, the Office, based on an intimate collaboration between the relevant JRC Institutes, would become the point of contact and common interface for national organisations, in particular public authorities and industries and for support to other Commission services including DGs V and XI.

18. In the field of ***Nuclear Fission Safety*** contributions are envisaged in the following areas with the objective of enhancing scientific and technical knowledge in this field:

- ***Reactor Safety;***
- ***Safeguards and Fissile Materials Management;***
- ***Radioactive Waste Management and***
- ***Actinides in Nuclear Fuel Cycle Safety.***

#### ***Reactor Safety***

The JRC activities will concentrate on:

- ***Accident Prevention Studies;***
- ***Severe Accident Studies participating in risk assessment and concentrating on the study of phenomena using the FARO facility at Ispra and sharing the PHEBUS PF project at Cadarache (CEA - France).***

#### ***Safeguards and Fissile Materials Management***

The Safeguards and Fissile Materials Management research activities will be structured into three main areas:

- ***Development of Nuclear Materials Measurements;***
- ***Development of Containment and Surveillance Techniques;***
- ***Integration of Safeguards Measures.***

This research conducted in networks of collaborating national laboratories, underpins and provides timely results on the conception of new techniques essential for the fulfilment of the Commission's obligations for Safeguards in the Community and the agreement with the International Atomic Energy Agency (IAEA).

#### ***Radioactive Waste Management***

JRC activities on radioactive waste management have two objectives:

- ***to support the present strategy of Member States, which aims at the disposal of radioactive waste resulting from fuel reprocessing (or directly disposing spent fuels considered as a waste) in geological formations;***

- *to carry out research on management strategies which may lead to a diminution of waste arising in future fuel cycle installations, thus mitigating the acceptability problems of final waste disposal.*

#### **Actinides in Nuclear Fuel Cycle Safety**

It is proposed to continue research carried out thus far under the heading "*Nuclear Fuels and Actinide Research*" with a new programme entitled "*Actinides in Nuclear Fuel Cycle Safety*".

Specifically, the programme for 1992-1994 will focus on the following subjects:

- *Safety studies of nuclear fuel behaviour (UO<sub>2</sub> and MOX) at extended burn-up, under transient, off-normal and accident conditions;*
- *Basic physico-chemical and solid state studies on actinides;*
- *Study of nuclear aerosols;*
- *Mitigation of the minor actinides and other long-lived radioactive nuclides arising in the nuclear fuel cycle;*
- *Plutonium fuel technology (minor activity aimed at maintaining competence in the field).*

19. In the field of ***Controlled Thermonuclear Fusion*** the JRC activities will be largely oriented towards the objective of improving the knowledge base of those aspects of fusion machines which are related to safety and environmental problems as requested by the European Fusion Programme. The most significant facility for this purpose at the JRC is ETHEL, the laboratory for handling tritium which is currently reaching completion at Ispra.

The JRC effort will be focussed on the Support to the Next Step (NET/ITER), namely:

- *acquisition of data and execution of tests in order to define the methods and procedures for safe handling of tritiated systems during operation and for storage and disposal of tritiated wastes by use of the European Tritium Handling Experimental Laboratory (ETHEL);*
- *contribution to design and safety analyses of in-vessel components;*
- *development of tools and procedures for remote operation of reactor components;*
- *evaluation, testing and establishment of a data base for structural materials properties and nuclear data*

Long term studies will involve:

- *development of low activation materials;*

20. The JRC will contribute to the Human Capital and Mobility theme of the Framework Programme by providing such opportunities as:

- *periods of attachment for training and new perspectives (mobility) for promising young researchers, notably at the post-doctoral level, selected in agreement with national research centres and laboratories participating in the Human capital and Mobility Programme and with whom the JRC has established collaboration. The action is thus contributing both to the training and mobility of young researchers in Europe and to the creation and consolidation of scientific and technological cooperation networks of research teams and laboratories. The training will be concentrated on advanced research topics and research requiring access to unique experimental facilities, while respecting the subsidiarity principle.*

This important flow of research trainees will also be offered, during their stay at the JRC, additional opportunities to become acquainted with the European dimension of research, Community policies and a multi-cultural environment, which is an important side benefit much appreciated by past and present JRC visiting researchers.

#### **SCIENTIFIC AND TECHNOLOGICAL SUPPORT FOR THE COMMISSION**

21. The above-cited Council Resolution (section 13 above) formalized work undertaken by the JRC as "scientific and technological support for the Commission", for other services. In the 1988-1991 Multiannual period, this group of activities has enjoyed a steadily increasing popularity and, with expenditure for the period estimated at 131 Mioecu, has outgrown the original budgetary predictions (120 Mioecu). Much attention has been paid to applying the customer/contractor principle to all work undertaken and a formal contract is drawn up between the JRC and the "client" Directorate General or Service for all except the most minor matters. The success of this exercise leads to the conclusion that the JRC is bringing a significant contribution to the Commission's much larger requirements for expert assistance and consultancy. The same tested formula will be applied to the period 1992-1994 with emphasis on:

- the reinforcement of the customer/contractor principle, notably through the assurance that all foreseeable multiannual operations are covered by a multiannual contract calling for precise work assignment and accountability with the customer Directorate-General, and that major multiannual projects are covered by a Council Decision or by a Commission decision upon the initiative of the customer Directorate-General. This is currently the case with one project for the Directorate-General for Agriculture and the Statistical Office, while plans are under way for a Commission Decision on new work for the Safeguards Directorate under the Directorate-General for Energy;
- conversely, a decision that other requests, mostly of a consultancy type, are limited to those of a clear temporary basis and for which a subsidiarity principle could apply.

Amongst the new activities for 1992-1994 are the operations of a Centre for Validation of Alternative Testing Methods (i.e. alternative to animal tests in toxicology) as support to DG XI and operations of on-site safeguards laboratories as support to DG XVII.

### **CONTRACTUAL WORK FOR EXTERNAL THIRD PARTIES**

22. At the same time when instituting the other JRC activities, the Council, in its Resolution, believed that contractual work for external third parties should be developed, thus demonstrating the customer/contractor principle under the most stringent conditions in the Community and in world scientific markets. Although the initial target figures have proved to be over-ambitious for 1988-1991 (52 Mioecu compared to the latest estimate of 40 Mioecu for the value of contracts signed during the period), much effort has been applied and from the feedback received from JRC customers, quality and speed of service are considered to be of a high order.

The Commission attaches great importance to the stimulation introduced by this measure, bringing, as it does:

- closer contact with the "real world";
- measure of one's own competitiveness;
- valorisation of existing potential additional income.

A new target has been set for 1992-1994 and to achieve it the JRC has already strengthened its marketing efforts, both at Institute and central levels. Classical marketing activities, however, are not enough; to fulfil the role of the JRC, it is of paramount importance that the latter is perceived as a partner, rather than a competitor, amongst national research laboratories. This concern calls for new and imaginative schemes for joint marketing with national partners, as described in Section 25 below.

### **EXPLORATORY RESEARCH**

23. Another new group of activities now reaching maturity is exploratory research, previously termed "preparatory research". Projects under this heading have the purpose of:

- the improvement of scientific vitality and potential;
- the exploration of suitable and promising avenues;
- the testing of new ideas or concepts on a small experimental scale;
- the provision of additional facilities for visiting scientists and research fellows;
- the enhancement of the impact of industrial club activities.

Due account of the value of this task, as emphasized by the Board of Governors, is reflected in the setting of levels of activity for 1992-1994.

### **EXPLOITATION AND DISSEMINATION OF RESEARCH RESULTS**

24. The exploitation and dissemination of the research results will continue to be performed in close coordination with the Directorate-General DG XIII "Telecommunications, Information Industries and Innovation". Within the JRC itself, a network should be constructed, linking well-focussed information centres (such as the Information Centre for Advanced Materials

or the Actinides Information Centre). This network could be extended to include one or several information centre(s) for prenormative research in:

- non-destructive evaluation techniques;
- structure reliability and codes of practice;
- measurement devices for pollution control;
- and indeed the proposed Centre for Earth Observation.

Along the same lines it is planned to set up within the JRC a European Office for Safety initially comprising the following units (which are described in Section 17):

- a Centre for Accident Analysis;
- a Structural Integrity Centre;
- an Accident Management Centre.

The exploitation and dissemination of research results received a new scope with the Framework Programme 1990-1994 and 1% of all resources were assigned to this. The task for the dissemination and valorisation of scientific results is, by decision of the Commission, conferred to the Directorate-General XIII.

25. Closely related to the exploitation of research results is the question of a possible JRC role in product or process innovation. While adhering to the view that an institution such as the JRC should conduct research predominantly on the basis of external pull, a certain amount of R&D which has the character of technology push is reasonable. Exploratory research can be an important source of this.

Innovative R&D requires a positive, motivating approach, an inventiveness, and an awareness of the market place. Clearly this is an activity more appropriate to industry's involvement in product development and marketing. Nevertheless, there is scope for the encouragement of innovative R&D in the JRC; for one reason, the successful outcome of an innovative piece of R&D which eventually becomes expressed in the form of industrial products, can attract an enormous amount of positive publicity for the Centre, and can generate considerable income.

The JRC approach should be to encourage creativity and the maturing of ideas even to the point of a prototype where industrial firms may become interested in picking up these ideas and converting them into profitable products. This approach is now commonly accepted in most research organisations. The important thing here is not to try to develop innovative research as a new category of R&D, but for management within the Institutes to spot ideas and encourage the staff to develop the innovative potential of them.

### **COMMON RESEARCH FACILITIES**

26. The highly specialized and in some cases unique facilities of the JRC constitute one of the most important assets of the organization. They represent a considerable investment and in some cases their operations are



quite costly, notably in the case of the nuclear installations. Yet, installations on a European scale and with a high degree of speciality, which contribute to reduce duplications in the Community, are an important part of the remit of the Centre and their very existence may be one of the driving forces for the future.

The Board of Governors therefore, quite naturally, keeps a constant watch on the use and further development of the specialised facilities of the JRC. Annual reports and other literature from the JRC aimed at a wider public provide detailed information on these facilities and on their availability. For strategic planning purposes - and without going into details in this chapter - the following guidelines may be suggested:

- it is a continuing remit of the JRC to construct and maintain specialised facilities provided that:
  - the customer base for the facilities is properly and convincingly assessed and identified at the time of conceiving the installation and throughout its lifetime;
  - the customer base is the same as for all other JRC activities: specific research programmes, support to the Commission and contractual work for external third parties. Some installations, however, may be seen as an element of the Centre's contribution to economic and scientific cohesion in Europe, but here again the customer base must be clearly identified for the particular installation in question.

27. A separate, but related issue, is that of JRC sites offering to host unique facilities, built by national or private organisations but conceived as "open shops", accessible to any partner inside the Community. This applies also to facilities developed as European Joint Ventures.

JRC sites can provide these "joint" facilities with appropriate technical support and scientific environments but would not intervene in their management, which remains independent. Visitors using these facilities can benefit from other services of the JRC, for instance in areas of training and education.

#### **COLLABORATION WITH NATIONAL RESEARCH**

28. The JRC should contribute to the development of intra-European cooperation and to the harmonious growth of all regions of the Community. This is already achieved through a series of formal and informal collaboration agreements with national research laboratories and can be further developed through active collaboration with public and private scientific organisations in all the Member States of the Community, notably by hosting at the JRC individual scientific visitors, grantholders and seconded national experts and by setting-up networks of associated laboratories. The collaboration will be further strengthened by the participation in the Human Capital and Mobility Programme.

Some of the agreements concluded with national laboratories call for joint marketing of collective competences and joint execution of research under contract with third parties. In one case this has led to plans for setting up a European Economic Interest Grouping between the JRC and its partners

comprising national research laboratories in materials research. This model should also be followed in other fields and could lead to a further consolidation of the significant and effective collaboration between the JRC and its national partners.

A complementary way of strengthening the interaction with national research to be considered could be to extend JRC activities to other locations than the current four sites.

A straightforward extension according to the pattern adopted for the four existing sites, i.e. full-bred new establishments, would raise difficulties, notably from a financial and human resources' point of view. New sites which would follow the current concept, would further strain the limited personnel and budgetary resources of the JRC by adding significantly to its overheads.

On the contrary, one should consider a new approach, i.e. the creation of JRC Outposts, working in strong synergy with host laboratories in Member States. Such outposts should be based on a strong motivation and mutual interest from both the JRC and the host laboratory to conduct research activities together. They should be created jointly by the JRC and a Government, a Region or a Science Park, the host authorities bearing the burden of infrastructure and subsequent running costs while JRC assigns a full team of researchers and finances the scientific specific credits.

A JRC outpost could be created in a flexible way for a given period of time - for the duration of joint experiments, for example - or on a more long-term basis. The level of its staffing should be strictly determined by the research requirements in each particular case, and may vary in time. Therefore, contrary to the case for the already established sites, there will be no concern for maintaining a minimum (and rather high) staff level to secure proper continuity and significance of the operations. The JRC, in providing a research team for an outpost, would not only bring a new dimension of challenge to the researchers of the Centre, but would also offer a new means of increasing mobility and would therefore secure the effective transfer of knowledge between the JRC and national research communities.

In all cases, the tightest synergy with a well-established national activity would be mandatory for the success of the operation.

Overall, an active outpost policy is felt to be a new way of strengthening the ties with national research in the Member States, meeting the precise requirements of specific regions, transferring the European vision and approach to local actors. Implementation of this policy should be initiated early in the 1992-1994 period.

#### **A BASE SCENARIO FOR JRC 2000**

29. Following an exercise to establish a basic plan, the JRC management, together with the Board of Governors, has elaborated different scenarios for the evolution of the JRC up to the year 2000. These scenarios recognize the continuation, on a long-term basis, of the current modes of operation:
- specific research programmes under the Framework Programme;
  - scientific and technical support to the Commission services;

- contractual work for external third parties;
- exploratory research.

Different ratios between these modes of operation have been considered, going from the present mix to mixes where support to the Commission or alternatively contractual work for external third parties become the predominant activity of the JRC.

30. The conclusion of these discussions favoured an evolution towards a JRC with a larger emphasis on the activity of scientific and technical support to the Commission. It finds its justification in the growing complexity and scope of scientific and technical issues to be faced by the Commission for the implementation of Community policies in the 1990's. This will imply recourse to a wide range of competent bodies such as national or European organisations, specialised agencies, including the JRC more closely linked than ever to Directorates-General responsible for policy formulation and implementation. An increase in real terms by about 30% for the 1992-1994 period from the 1991 level of Support to the Commission activities represents this trend.

Another feature of the scenario is a JRC which maintains an important but decreasing contribution to the successive Framework Programmes in areas where the Community truly benefits from the impartial and independent position of the JRC such as prenormative research on materials, environmental research and the spectrum of safety and risk assessment-oriented research. Furthermore, the Framework Programme contributions comprise recognized central functions such as safeguards R & D or actinides research and areas responding to Treaty obligations (Central Bureau for Nuclear Measurements). These contributions are joined by the important horizontal issue of human capital and mobility adding to the scope of the Centre as a training ground for young researchers and strengthening its collaboration with national research. All in all, the Framework Programme task from the 1988-1991 ratio of 69% of the totality of the JRC activities will diminish for the 1992-1994 period.

Contractual work for external third parties, with inclusion of the new modalities of collaboration with national research laboratories (see sections 22 and 28), should continue to represent a notable task of the JRC in the medium-term and in the long-term over the planning horizon, and certainly account for some 15-20% of the total activities of the Centre.

Finally, a relatively modest but not negligible share of the total activities must continue to be devoted to exploratory research which is most essential for maintaining the scientific vitality of the Centre and to ensure its availability to take up new scientific challenges in line with foreseen new demands.

The described proposals in the present document are elaborated as a first step towards the realisation of this base scenario for JRC 2000.

16. a-

**CHAPTER II**

**ORGANISATION**

**AND**

**RESOURCES**

## ORGANISATION AND RESOURCES

### STRUCTURE

1. The Commission intends to maintain the recently developed structure of the JRC Institutes for the 1992-1994 Programme period, the present structure being considered adequate.
2. An issue which requires constant attention is the achievement of a proper balance between excessive centralisation and complete decentralisation. Central functions should only remain when there is an economic advantage in terms of staff or budget, when coherence with general rules must be monitored and implemented and when the corporate image of the JRC is at stake.
3. Equally, the proper interface between the Institutes is a matter for constant surveillance particularly during periods where new programmes are under consideration. In general, it will never be possible to reach a state in which there is no need for Institutes to collaborate nor would that be desirable. The important issue is that of collaboration and maintenance of a collegiate concern in those projects, where a collaboration is necessary and to ensure that the definition of responsibilities is completely clear.
4. The increasing autonomy of the Institutes has as a corollary, notably for the Ispra based ones, a wish to perform a greater degree of the administration themselves. Conversely, they will draw less on the central administrative services. The first steps towards these ends have already been taken in the financial field. All in all, this trend does promise savings and rationalisation in the overall administrative services of the JRC.
5. A new management accounting system is currently being implemented. Its purpose is to establish the true cost of all the Centre's operations and set their correct price. This in turn will allow the Institutes to establish better the cost of all their activities, increase cost-awareness and provide a basis for a wider internal customer/contractor relationship between the Institutes and the internal central services.

The already established Management Efficiency Unit should contribute to a continuing watch that the general services of the JRC provide the best possible value for the resources available and contribute to the establishment of the internal customer/contractor relationship between the Institutes and central services.

6. At Ispra, the implementation of the new structure of Institutes, quite naturally posed a series of infrastructure problems which even now are only partially solved. Both for practical and psychological reasons, the various components of each Institute should be physically grouped together as far as is possible and economically feasible, thereby strengthening their individual identities.

**Table 1 - Financial Resources (in Mioecu)**  
(all amounts are given in current values)

|                                                    | Total JRC contributions* | Central Bureau for Nuclear Measurements | Institute for Transuranium Elements | Institute for Advanced Materials | Institute for Systems Engineering and Informatics | Environment Institute | Institute for Remote Sensing Applications | Safety Technology Institute | Institute for Prospective Technological Studies |
|----------------------------------------------------|--------------------------|-----------------------------------------|-------------------------------------|----------------------------------|---------------------------------------------------|-----------------------|-------------------------------------------|-----------------------------|-------------------------------------------------|
| <i>Materials</i>                                   | 65.34                    |                                         |                                     | 65.34                            |                                                   |                       |                                           |                             |                                                 |
| <i>Working Environment</i>                         | 11.88                    |                                         |                                     |                                  | 4.95                                              | 4.95                  |                                           | 1.98                        |                                                 |
| <i>Measurement and Testing</i>                     | 89.10                    | 62.37                                   |                                     |                                  | 8.91                                              |                       |                                           | 17.82                       |                                                 |
| <i>Environment</i>                                 | 148.50                   |                                         |                                     |                                  | 11.88                                             | 66.82                 | 36.63                                     | 33.17                       |                                                 |
| <i>Fission</i>                                     | 164.34                   |                                         | 60.39                               |                                  | 16.83                                             |                       |                                           | 87.12                       |                                                 |
| <i>Fusion</i>                                      | 40.59                    |                                         |                                     | 11.88                            | 11.88                                             |                       |                                           | 16.83                       |                                                 |
| <i>Human Capital</i>                               | 24.75                    | 2.97                                    | 2.97                                | 2.97                             | 3.96                                              | 1.98                  | 2.97                                      | 3.96                        | 2.97                                            |
| <b>Framework Programme Total**</b>                 | <b>544.50</b>            | <b>65.34</b>                            | <b>63.36</b>                        | <b>80.19</b>                     | <b>58.41</b>                                      | <b>73.75</b>          | <b>39.60</b>                              | <b>160.88</b>               | <b>2.97</b>                                     |
| <i>S&amp;T Support for the Commission</i>          | 190.00                   | 4.00                                    | 22.00                               | 14.00                            | 39.00                                             | 47.00                 | 37.00                                     | 18.00                       | 9.00                                            |
| <i>Contractual Work for External Third Parties</i> | 68.00                    | 3.00                                    | 10.00                               | 12.00                            | 12.00                                             | 10.00                 | 4.00                                      | 15.00                       | 2.00                                            |
| <b>Total</b>                                       | <b>802.50</b>            | <b>72.34</b>                            | <b>95.36</b>                        | <b>106.19</b>                    | <b>109.41</b>                                     | <b>130.75</b>         | <b>80.60</b>                              | <b>193.88</b>               | <b>13.97</b>                                    |
| <i>HFR Supplementary Programme</i>                 | 69.00                    |                                         |                                     | 69.00                            |                                                   |                       |                                           |                             |                                                 |
| <b>Grand Total</b>                                 | <b>871.50</b>            | <b>72.34</b>                            | <b>95.36</b>                        | <b>175.19</b>                    | <b>109.41</b>                                     | <b>130.75</b>         | <b>80.60</b>                              | <b>193.88</b>               | <b>13.97</b>                                    |

\* credits for exploratory research are included in these figures

\*\* the figures for Framework Programme activities are given after subtraction of 1% reserved for the centralised action of dissemination and exploitation of research results

## **FINANCIAL RESOURCES**

7. The distribution of financial resources for the 1992-1994 Programme period are given in Table 1 (on the preceding page) for the Framework Programme, Support to the Commission and Contractual Work for External Third Parties.

The fourth activity - Exploratory Research - will be funded, after approval by the Budgetary Authority, as follows:

6% of the Framework Programme Resources  
 3% of the Support to the Commission Resources\*  
 3% of the Contractual Work for External Third Parties Resources\* (outside HFR Supplementary Programme)

Table 2 below provides a breakdown in percentages of the JRC activities in 1992-1994 as compared with the 1988-1991 period.

**Table 2**

|                                                                                        | 1988-1991<br>Plan<br>(1988) | 1988-1991<br>Estimated<br>outcome | 1992-1994<br>Plan |
|----------------------------------------------------------------------------------------|-----------------------------|-----------------------------------|-------------------|
| <b>A. Specific Research Programmes</b>                                                 | 70.0                        | 70.7                              | 59                |
| <b>B. Contractual Work</b>                                                             |                             |                                   |                   |
| B.1 S/T Support to the Commission                                                      | 12.6                        | 14.1                              | 21                |
| B.2 Work for external public or private bodies (including HFR supplementary programme) | 13.7                        | 12.4                              | 15.5              |
| Total                                                                                  | 26.3                        | 26.5                              | 36.5              |
| <b>C. Exploratory Research</b>                                                         | up to 3.7                   | 2.8                               | 4.5               |
| Total                                                                                  | 100.0                       | 100.0                             | 100.0             |

The evolution as proposed here corresponds to a gradual transition towards a distribution in conformity with the Base Scenario for JRC 2000 described in the first chapter of the present document (Section 29).

## **HUMAN RESOURCES**

8. During the period 1988-1991, the total authorised statutory staff for the JRC has been fixed at 2180 agents; this figure has been used for the staff table which is approved for each budgetary exercise. Such a figure constitutes a ceiling which has never been reached because it was agreed in 1988 to reserve a part of the statutory staff credits for financing visiting scientists, seconded national staff and grantholders; the amount set aside in this way corresponded to the equivalent of financing about 100 statutory staff.
9. For the period 1992-1994, the situation will be different. Thanks to credits available within the JRC part of the Human Capital and Mobility

\* These two parts of the Exploratory Research Resources effectively represent incentives for the Institutes to increase their activities under these headings.

programme, young visiting researchers will be paid directly by the specific programme credits; it is foreseen that 200 of such young visiting researchers will be hosted annually at the JRC for the period 1992-1994.

10. Senior Visiting Scientists and staff seconded from national organizations in the Member States will still be financed within the envelope of statutory staff credits. They are estimated at a total of 30 to 40 per year.
11. Taking into account this new situation as well as the level of credits which can reasonably be devoted to staff expenditure within the total envelope of JRC resources, it is foreseen to reduce the level of authorized statutory staff to 2080 agents. Such a reduction responds to the wish of the European Parliament to see a decrease in the margin between the authorized ceiling and the effective level of staffing.

### **Early Retirement Measures**

12. Following the encouragement in 1988 by some Member States, the JRC examined with the Board of Governors the need for a scheme for early retirements of JRC officials. Taking into account the age structure and the scientific-technical competences necessary for the development of the JRC, it was established that the scheme should allow for 30 departures in 1992, 25 in 1993 and 20 in 1994 of officials more than 55 years old and having accomplished at least 15 years of service, with a profile taking into account the needs of the JRC and notably at the more senior levels. The Commission will present a separate proposal for this scheme.

## **DECISION MAKING AND CONSULTATIVE STRUCTURES**

### **The JRC Board of Governors**

13. As part of the revitalisation of the JRC (COM(87)491 final/2), the Commission proposed to give the JRC Board of Governors a more influential rôle in the decision making process of the JRC. In particular, it is recognised that the responsibility for formulating and carrying out research activities corresponding to the objectives of the Framework Programme should be the province of the JRC and its Board of Governors. This proposal has been implemented by the Commission in June 1988 and the Board now plays a central rôle in JRC managerial decisions. The Commission has expressed its full appreciation of the Board's work and does not propose to make any changes to the current arrangements.

### **The Advisory Committees for the Scientific Institutes**

14. Most of the JRC Institutes now possess operational Advisory Committees and the remaining ones will be established very shortly. The role of these Committees is to ensure, through their opinions, that the work of the Institutes is geared to the real requirements of their customers and users and that a high scientific standard is maintained within the Institutes.

### **Contacts with other Bodies and Advisory Committees**

15. Consultation of the Economic and Social Committee is obligatory under both the EEC and Euratom Treaties.



Under the EAEC Treaty, Euratom's Scientific and Technical Committee (STC) will continue to be consulted on research programmes pursuant to the Treaty. The STC will see that the themes selected for these programmes are geared to the needs of the customer, who in this case is essentially the Community at large. The Committee for Scientific and Technological Research - CREST - will play its role of Adviser, both to the Commission and the Council, in discussing the place of the JRC in the overall S & T policy of the Community; it will also play a similar role to that of the STC for the nuclear part, namely to ensure that the themes selected meet the customer's (i.e. the Community) needs.

For the JRC's fusion activities, opinions will be obtained from the Fusion Technology Steering Committee which covers all Community activities on the subject.

Close coordination will be maintained with appropriate CGCs, CANs (Committees of an Advisory Nature) or similar committees which will be systematically provided with full information on JRC activities and results. This will ensure, where necessary, coordination with shared-cost projects and national activities in the same field.

For the HFR Supplementary Programme the existing ACPM (Advisory Committee for Programme Management) will be continued.

21. a.

## **CHAPTER III**

# **PROPOSALS FOR COUNCIL RESOLUTION AND DECISIONS**

COUNCIL RESOLUTION

of .....

concerning activities to be undertaken by the Joint Research Centre (JRC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Commission's communication entitled ... submitted to the Council on ...

Having regard to the Commission proposals concerning specific research and development programmes to be executed by the Joint Research Centre for the implementation of the third framework programme for Community activities in the field of research and technological development (1990-1994).

Whereas, by its Resolution of 29 June 1988<sup>(1)</sup> the Council defined the scope of activities to be undertaken by the Joint Research Centre and indicated an estimation of the Centre's overall expenditure for the period 1988-1991;

Whereas, a significant contribution by the Joint Research Centre to Community research and technological development policy implies, in the long term, the redeployment of its fundamental and applied research activities;

1. REAFFIRMS the Community character of the Joint Research Centre (JRC) and its role in achieving the Community's aim of strengthening the scientific and technological basis of European industry and encouraging it to become more competitive;
2. CONSIDERS that the JRC is called to contribute to the implementation of the framework programme, particularly in those fields in which it can offer an impartial and independent expert opinion for the benefit of all Community policies.
3. CONSIDERS that, with a view to contributing to the objective of the economic and social cohesion of the Community, the JRC should also develop practical and significant initiatives to reinforce collaboration with the research centres and laboratories of all Member States, thereby assuming the role of catalyst of European scientific integration;
4. AFFIRMS that the JRC in its institutes, next to its task of executing specific research programmes including exploratory research, should have an increasing task, utilizing the facilities and manpower at its disposal, of strengthening and developing its work for other Commission Services and contractual work for external third parties in those areas, where it is competent to do so;
5. URGES that during the 1992-1994 period the objectives of the JRC as well as its expenditure should be defined in conformity with the annex.
6. INVITES the Commission to include appropriate information on all the aforementioned categories of activity in the annual implementation report which it is called upon to submit to the European Parliament and the Council.

---

(1) OJ No C 197, 27. 7. 1988, p 4.

ANNEX

Estimate of the Overall Expenditure of the JRC  
(1992 to 1994)

|    |                                                                                                                    |                       |
|----|--------------------------------------------------------------------------------------------------------------------|-----------------------|
| A. | Implementation of the framework programme<br>by means of specific research programmes and<br>exploratory research: | (in million Ecu)      |
| -  | EEC research programmes                                                                                            | 339.57                |
| -  | EAEC research programmes                                                                                           | <u>204.93</u>         |
|    | Subtotal A                                                                                                         | 544.50 <sup>(1)</sup> |
| B. | Contractual Work                                                                                                   |                       |
| -  | Scientific and technological support<br>for the Commission                                                         | 190.0                 |
| -  | Work to be financed by external<br>private or public bodies (*)                                                    | <u>137.0</u>          |
|    | Subtotal B                                                                                                         | 327.0                 |
|    | Total                                                                                                              | 871.5                 |

---

(\*) Note: HFR = 69 million Ecu

(1) An amount of Ecu 5.5 million, not included in the Ecu 544.5 million, is reserved for the centralized action of dissemination and exploitation provided for in Article 4 of the Council Decision of 23 April 1990 concerning the framework programme of Community activities in the field of research and technological development (1990 to 1994)

Proposal for a  
Council Decision

of .....

adopting specific research programmes to be implemented  
by the Joint Research Centre for the  
European Economic Community (1992 to 1994)

(.../EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES

Having regard to the Treaty establishing the European Economic Community, and in particular Article 130q (2) thereof,

Having regard to the proposal from the Commission<sup>(1)</sup>,

In cooperation with the European Parliament<sup>(2)</sup>,

Having regard to the opinion of the Economic and Social Committee<sup>(3)</sup>,

Whereas by its Decision 90/221/Euratom, EEC<sup>(4)</sup>, the Council adopted a third Framework Programme for Community activities in the field of research and technological development (1990-1994), specifying in particular the activities to be pursued concerning enabling technologies, the management of natural resources and the management of intellectual resources; whereas this Decision should be taken in the light of the grounds set out in the preamble to that Decision;

Whereas Article 130k of the Treaty stipulates that the Framework Programme is to be implemented through specific programmes developed within each activity;

Whereas the Joint Research Centre, as set out in Decision 90/221/Euratom, EEC, is called on to contribute to the implementation of the framework programme particularly in those fields in which it can offer an impartial and independent expert opinion for the benefit of all Community policies;

Whereas the Joint Research Centre can contribute to the realisation of said actions, particularly in the fields of industrial and materials technologies, measurement and testing, human capital and mobility and in the field of the environment;

Whereas in particular these actions should benefit from the setting-up, within the JRC, of a centre for earth observation and of a European office for safety;

Whereas the Joint Research Centre with its laboratories and installations can provide an efficient point of assembly for the training of young researchers;

Whereas in the context of these programmes it is desirable that an assessment be made of the economic and social impact as well as of any technological risks;

---

(1) OJ No C

(2) OJ No C

(3) OJ No C

(4) OJ No L 117, 8. 5. 1990, p. 28.

Whereas pursuant to Article 4 and Annex I of Decision 90/221/Euratom, EEC, the funds estimated as necessary for the whole Framework Programme include an amount of ECU 57 million for the centralized dissemination and exploitation of results, to be divided up in proportion to the amount envisaged for each specific programme;

Whereas Decision 90/221/Euratom, EEC provides that a particular aim of Community research must be to strengthen the scientific and technological basis of European industry, and to encourage it to become more competitive at the international level; whereas that Decision also provides that Community action is justified where research contributes, *inter alia*, to the strengthening of the economic and social cohesion of the Community and to the promotion of its overall harmonious development, while being consistent with the pursuit of scientific and technical excellence; whereas the Programmes of the Joint Research Centre should contribute to the achievement of these objectives;

Whereas the Board of Governors of the Joint Research Centre plays a significant part on one hand in the administrative operation of the Centre and on the other, in the implementation of its research programmes;

Whereas the Scientific and Technical Research Committee (CREST) has been consulted,

HAS ADOPTED THIS DECISION:

#### *Article 1*

The specific research and development programmes to be executed by the Joint Research Centre for the European Economic Community in the fields of industrial and materials technology, measurement and testing, environment as well as in the field of human capital and mobility, as defined in Annex I, including exploratory research activities, are hereby adopted for a period running from 1 January 1992 to 31 December 1994.

#### *Article 2*

1. The funds estimated as necessary for the execution of the programmes amount to 339.57 million Ecu.
2. An indicative allocation of funds is set out in Annex II.
3. Should the Council take a decision pursuant to Article 1, paragraph 4, of Decision 90/221/Euratom, EEC, this Decision shall be adapted accordingly.

#### *Article 3*

Detailed rules for the implementation of the programme are set out in Annex III.

#### *Article 4*

1. The Commission shall each year before 31 March submit to the European Parliament and the Council a report on the implementation of this Decision.
2. This report shall be accompanied by the observations of the board of governors. The latter may also submit through the Commission to the European Parliament and the Council a separate report on any aspect of the implementation of this Decision.

*Article 5*

1. Research carried out by the Joint Research Centre will be evaluated by a group of independent external experts set up by the Commission after consulting the board of governors. A report on the subject shall be established at the end of the programmes.

2. The evaluation report, accompanied by the opinion of the board of governors of the Joint Research Centre, shall be transmitted by the Commission to Parliament and the Council.

*Article 6*

The reports referred to in Articles 4 and 5 shall be established having regard to the objectives set out in Annex I to this Decision and in accordance with Article 2 (4), of Decision 90/221/Euratom, EEC.

*Article 7*

1. The Commission, assisted by the board of governors of the Joint Research Centre, shall be responsible for carrying out this Decision and to that end shall call upon the services of the Joint Research Centre in which is vested the responsibility for the formulation and execution of research activities responding to the objectives of the Framework Programme.

2. The Commission, in cooperation with the board of governors, shall ensure periodical consultation with relevant Committees to ensure coordination between shared cost actions and those of the Joint Research Centre in the same areas with the aim of ensuring a coherent approach.

*Article 8*

The Commission shall decide on the terms of reference of the board of governors.

*Article 9*

The Commission is authorized to negotiate, in accordance with Article 130n of the Treaty, international agreements with third country members of COST, in particular member countries of the European Free Trade Association (EFTA) and Central and Eastern European Countries, with a view to associating them with all or part of the programmes.

*Article 10*

This decision is addressed to the Member States.

Done at .....

*For the Council*

*The President*

## ANNEX I

### Scientific and technical objectives

The specific research programmes, executed for the EEC, fully reflect the approach embodied in the Third Framework Programme in terms of the scientific and technical goals and the underlying aims which it pursues.

Paragraphs 2a and c, 3a, b and d and 6 of Annex II of the Framework Programme form an integral part of the present JRC multiannual programme.

The following presents a summary of the objectives of the programmes based on and taking into account the above elements.

#### 1. Enabling Technologies

##### 2. Industrial and Materials Technologies

- The objective is to provide a contribution to the strengthening of European industry and its working environment by extending its scientific base through research and development work. Next to basic technological research, the emphasis will be on the acquisition of the scientific and technical knowledge needed in order to establish standards and codes of good practice facilitating the transfer of technologies, and the harmonization of methods of measurement and testing.
- Working environment: this activity will be devoted to pre-normative research on subjects such as toxicology and occupational health, occupational accident research and risk prevention in collaboration with national research and with the aim of assuring the transfer of new knowledge to Community and national regulatory authorities.
- Materials: Research will be oriented towards areas which all have a strong prenormative dimension and represent important enabling technologies for a whole range of advanced industrial applications. Projects have the objective of helping to ensure that Community manufacturing industry has better access to a range of cost-effective, well-characterized advanced materials and that these materials are incorporated into high performance components. The activity also provides a focal point for the exchange of information on prenormative research on advanced materials. The research supported by unique facilities at the JRC will be conducted in close contact with manufacturing and user industries and furthermore aim at supporting wider European and International standardisation efforts in the vast field of new materials.
- Measurement and testing: this centres around activities in both the nuclear and non-nuclear field of Reference Materials and Measurements carried out by the Central Bureau for Nuclear Measurements. Research in the growing application of these specialized techniques to non-nuclear areas will capitalize on existing experimental facilities including the particle accelerators. The objective is to ensure the availability of up to date methods and reference materials for industry, standardisation bodies and national and Community authorities. A similar objective will be the pursuit of specific prenormative research activities in the fields of Reliability of Structures, notably oriented towards the building and construction industries, in extensive collaboration with national research and focussing both on theoretical models and exploitation of experimental facilities, and on a lesser scale, in renewable Energies (Photovoltaic) centred around the existing facilities for testing and measurement.



## II Management of Natural Resources

### 3 Environment

- The objective is to provide a contribution to the scientific knowledge, technical know-how and data needed by the Community, in particular to carry out its role with regard to the environment, as spelt out in Title VII of the EEC Treaty, and with particular emphasis on prenormative work.
- Protection of the environment: prenormative research on atmospheric chemistry, modelling of air pollution transport, research on biosphere-atmosphere interaction, notably as a contribution to the global change programmes, in collaboration with national research. Development of techniques and systems to protect and rehabilitate the natural environment, with emphasis on engineering and techniques for monitoring the environment, and research on treatment of toxic waste, of contaminated soils and of waste water.

Acquisition, validation, storage of data relevant to the above research, and making such data available to public and private bodies.

- Applications of remote sensing: research, with development of techniques for applications of data derived from earth observation satellites, on environmental mapping and monitoring, particularly of less favoured areas of the Community. Application of similar techniques as a contribution to global change programmes with emphasis on the monitoring of marine environment and on processes related to large scale changes in terrestrial ecosystems. Development of a series of advanced techniques, their technologies and engineering, for use in connection with the exploitation of new earth observation systems, including microwave remote sensing, imaging spectroscopy and data processing.

The research on environmental technologies and engineering will underpin the contribution to the European Environment Agency with development of new instruments and trial techniques, to the harmonization of methods of measurement and to intercalibration.

The research and application of remote sensing techniques will be performed in collaboration with national research and users, and in collaboration with the European Space Agency.

The above-described data-oriented activities will be concentrated around a Centre for Earth Observation to be established in harmony with the European Space Agency and national organisations with the aim of providing adequate and timely information on the state of the environment. The preparatory phases and prototype implementation for this Centre are included in the 1992-1994 programme period.

- Industrial hazards: prenormative research on reliability of systems and on studies of the assessment and management of technological risks, including use of experimental facilities for assessing such risks and investigating accidents. This will include the development of decision support systems for plant safety, plant emergency management and territorial risk management. In order to accelerate the interaction with national research and facilitate the transfer of knowledge to industry and national and Community authorities, there will be established, within the JRC, a European Office for Safety acting initially through three executive centres for accident analysis, accident management and structural integrity, the latter will also draw upon the research performed under measurement and testing.

6. Human Capital and Mobility

- The objective is to provide a particular contribution to help increase the human capital in terms of research and technological development, which the Member States will be needing for the next decade, and to focus on the interaction and collaboration between national teams and laboratories in all Member States and the JRC.

Actions will be chiefly aimed at training young researchers embarking on careers in research and technological development by offering them temporary attachment to the JRC institutes and embedding them in research teams working in collaboration with national teams and laboratories in all Member States on projects both of a theoretical nature or on the utilization of existing or new experimental facilities. A particular emphasis will be paid to the mobility between the national teams and laboratories and the JRC institutes with concertation on the choice of joint projects within the area of research of the national teams and laboratories and the JRC and a joint selection mechanism for the young researchers to benefit from the scheme.

While encompassing collaboration with all Member States, account must be taken of demographic factors and of the research and training structures peculiar to the various States, to help each of them to acquire the best possible capabilities.

ANNEX II

Amounts deemed necessary for specific programmes with indicative  
breakdown of expenditures for the period 1992-1994

I. ENABLING TECHNOLOGIES

2. Industrial and Materials Technologies

- |                                         |                                  |
|-----------------------------------------|----------------------------------|
| - Industrial and materials technologies | 77.22 million Ecu <sup>(1)</sup> |
| - Measurement and Testing               | 89.10 million Ecu <sup>(1)</sup> |

II. MANAGEMENT OF NATURAL RESOURCES

3. Environment

- |               |                                   |
|---------------|-----------------------------------|
| - Environment | 148.50 million Ecu <sup>(1)</sup> |
|---------------|-----------------------------------|

III. MANAGEMENT OF INTELLECTUAL RESOURCES

6. Human Capital and Mobility

- |                              |                                  |
|------------------------------|----------------------------------|
| - Human Capital and Mobility | 24.75 million Ecu <sup>(1)</sup> |
|------------------------------|----------------------------------|

|       |                                   |
|-------|-----------------------------------|
| TOTAL | 339.57 million Ecu <sup>(2)</sup> |
|-------|-----------------------------------|

-----  
(1) An amount equivalent to 6% of these amounts may be used for exploratory research.

(2) An amount of 3.43 million Ecu not included in the 339.57 million Ecu is reserved, as a contribution from the specific programmes of the present decision, for the centralized action on dissemination and exploitation of results.

ANNEX III

**Rules for implementing the programmes and activities  
for dissemination and exploitation of the results**

1. The Commission, assisted by the board of governors of the Joint Research Centre, shall implement the programmes on the basis of the scientific and technical objectives and content described in Annex I.

2. The rules for implementing the programmes, referred to in Article 3, comprise research and technological development projects and accompanying measures.

The projects shall be the subject of research and technological development performed in the relevant Institutes of the JRC (Joint Research Centre).

3. The Institutes of the JRC shall endeavour, whenever feasible, to execute the projects in proper collaboration and in concert with national research bodies in the Member States. Particular attention will be paid to associations with industry, notably with small and medium sized enterprises in collaborative schemes around the projects. In the same way, research bodies established in Third Countries having concluded international agreements with the European Community in accordance with Article 130n of the Treaty, may also collaborate on the projects.

4. The accompanying measures shall include:

- the organization of seminars, workshops and scientific conferences;
- the activities of internal coordination, including the organization of particular internal centres, which ensure homogeneity of the approach and a unique common interface to the users of and partners in the projects;
- the activities of specialized training with accent on multidisciplinary;
- a system for information exchange;
- the promotion of the exploitation of the research results
- the scientific and strategic independent evaluation of the performance of the projects and the programmes.

5. The dissemination of the knowledge gained through the realization of the projects will be done on the one hand by the programmes themselves, and on the other hand by the centralized action as described in Article 4, paragraph 3 of the decision 90/211/Euratom/EEC.

Proposal for a  
Council Decision

of .....

adopting specific research programmes to be implemented  
by the Joint Research Centre for the  
European Atomic Energy Community (1992 to 1994)

(.../.../Euratom)

THE COUNCIL OF THE EUROPEAN COMMUNITIES

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 consultation of the Scientific and Technical Committee<sup>(1)</sup>,

Having regard to the opinion of the European Parliament<sup>(2)</sup>,

Having regard to the opinion of the Economic and Social Committee<sup>(3)</sup>,

Whereas by its Decision 90/221/Euratom, EEC<sup>(4)</sup>, the Council adopted a third Framework Programme for Community activities in the field of research and technological development (1990-1994), specifying in particular the activities to be pursued concerning the management of natural resources; whereas this Decision should be taken in the light of the grounds set out in the preamble to that Decision;

Whereas, for activities falling under the EAEC Treaty, Article 2 of the Decision 90/221/Euratom, EEC provides for the implementation of the third Framework Programme through programmes adopted in accordance with Article 7 of the said Treaty;

Whereas the Joint Research Centre, as set out in Decision 90/221/Euratom, EEC, is called on to contribute to the implementation of the framework programme particularly in those fields in which it can offer an impartial and independent expert opinion for the benefit of all Community policies;

Whereas the Joint Research Centre can contribute to the realisation of said actions, particularly in the fields of research in nuclear fission safety and controlled thermonuclear fusion, especially concerning prenormative aspects;

Whereas in the context of these programmes it is desirable that an assessment be made of the economic and social impact as well as of any technological risks;

Whereas pursuant to Article 4 and Annex I of Decision 90/221/Euratom, EEC, the funds estimated as necessary for the whole Framework Programme include an amount of ECU 57 million for the centralized dissemination and exploitation of results, to be divided up in proportion to the amount envisaged for each specific programme;

---

(1) OJ No C

(2) OJ No C

(3) OJ No C

(4) OJ No L 117, 8. 5. 1990, p. 28.

Whereas Decision 90/221/Euratom, EEC provides that a particular aim of Community research must be to strengthen the scientific and technological basis of European industry, and to encourage it to become more competitive at the international level; whereas that Decision also provides that Community action is justified where research contributes, inter alia, to the strengthening of the economic and social cohesion of the Community and to the promotion of its overall harmonious development, while being consistent with the pursuit of scientific and technical excellence; whereas the Programmes of the Joint Research Centre should contribute to the achievement of these objectives;

Whereas the board of governors of the Joint Research Centre plays a significant part on one hand in the administrative operation of the Centre and on the other, in the implementation of its research programmes;

HAS ADOPTED THIS DECISION:

#### *Article 1*

The specific research and development programmes to be executed by the Joint Research Centre for the European Atomic Energy Community in the fields of research in nuclear fission safety and controlled nuclear fission, especially concerning prenormative aspects, as defined in Annex I, including exploratory research activities, are hereby adopted for a period running from 1 January 1992 to 31 December 1994.

#### *Article 2*

1. The funds estimated as necessary for the execution of the programmes amount to ECU 204 93 million.
2. An indicative allocation of funds is set out in Annex II.
3. Should the Council take a decision pursuant to Article 1 (4), of Decision 90/221/Euratom, EEC, this Decision shall be adapted accordingly.

#### *Article 3*

Detailed rules for the implementation of the programmes are set out in Annex III.

#### *Article 4*

1. The Commission shall each year before 31 March submit to the European Parliament and the Council a report on the implementation of this Decision.
2. This report shall be accompanied by the observations of the board of governors. The latter may also submit through the Commission to the European Parliament and the Council a separate report on any aspect of the implementation of this Decision.

#### *Article 5*

1. Research carried out by the Joint Research Centre will be evaluated by a group of independent external experts set up by the Commission after consulting the board of governors. A report on the subject shall be established at the end of the programmes.

2. The evaluation report, accompanied by the opinion of the board of governors of the Joint Research Centre, shall be transmitted by the Commission to Parliament and the Council.

#### *Article 6*

The reports referred to in Articles 4 and 5 shall be established having regard to the objectives set out in Annex I to this Decision and in accordance with Article 2 (4), of Decision 90/221/Euratom, EEC.

#### *Article 7*

1. The Commission, assisted by the board of governors of the Joint Research Centre, shall be responsible for carrying out this Decision and to that end shall call upon the services of the Joint Research Centre in which is vested the responsibility for the formulation and execution of research activities responding to objectives of the Framework Programme.

2. The Commission, in cooperation with the board of governors, shall ensure periodical consultation with relevant Committees to ensure coordination between shared cost actions and those of the Joint Research Centre in the same areas with the aim of ensuring a coherent approach.

#### *Article 8*

The Commission shall decide on the terms of reference of the board of governors.

#### *Article 9*

The Commission is authorized to negotiate, in accordance with Article 101, second indent of the Treaty, international agreements, notably with third country members of COST, especially member countries of the European Free Trade Association (EFTA) and Central and Eastern European Countries, with a view to associating them with all or part of the programmes.

#### *Article 10*

This decision is addressed to the Member States.

Done at . . . . .

*For the Council*

*The President*

## ANNEX I

### Scientific and technical objectives

The specific research programmes, executed for the EAEC, fully reflect the approach embodied in the Third Framework Programme in terms of the scientific and technical goals and the underlying aims which it pursues.

Paragraphs 5b and 5c of Annex II of the Framework Programme form an integral part of the present JRC multiannual programme.

The following presents a summary of the objectives of the programmes based on and taking into account the above elements.

#### II Management of Natural Resources

##### 5. Energy

- Nuclear Fission Safety: the aim is to support Member States in the fulfilment of their responsibilities for regulating and protecting the environment and responding to Treaty obligations. The particular work underlining the prenormative dimension will contribute to the enhancement of scientific and technical knowledge related to reactor safety by the conduction of accident prevention research and severe accident studies, participating in the development of risk assessment methods and techniques and concentrating on the study of phenomena by using an existing JRC experimental installation and by sharing a national research facility. In the area of safeguards and fissile materials management, the research conducted in networks of national laboratories underpins and aims at the provision of timely results or new techniques essential for fulfilling Treaty obligations for safeguards, as well as those of the Non-Proliferation Treaty. Work will include nuclear materials measurements, containment and surveillance techniques and the integration of safeguards measures. JRC objectives in the area of radioactive waste management are to support the present strategy of the Member States, aiming at the disposal of radioactive waste in geological formations and to carry out research on management strategies which may lead to a diminution of waste arising from future fuel cycle installations. Research conducted in collaboration with national laboratories will benefit from existing and newly constructed experimental facilities.

Activities in the nuclear fuel cycle safety area will focus on safety studies concerning nuclear fuel behaviour, basic studies on actinides, study of nuclear aerosols, together with the mitigation of the minor actinides and other long-lived radioactive nuclides in the nuclear fuel cycle.

- Controlled Thermonuclear Fusion: this activity is intended to improve the knowledge base and technology of safety and environmental aspects of future fusion machines for the European Fusion Programme. The main part of the work will be in support to the Next Step (NET/ITER). An important feature of this programme will be the operation of the ETHEL Laboratory for the experimental study of the safe management of tritium. Other support to the Next Step will encompass design and development in specific technological areas such as remote handling of in-vessel components, plasma-facing components tests, data base for structural materials properties and nuclear data. Long term actions will include low activation materials research.



ANNEX II

Amounts deemed necessary for specific programmes with indicative  
breakdown of expenditure for the period 1992-1994

II. MANAGEMENT OF NATURAL RESOURCES

5. Energy

|                                   |                                   |
|-----------------------------------|-----------------------------------|
| - Nuclear Fission Safety          | 164.34 million Ecu <sup>(1)</sup> |
| - Controlled Thermonuclear Fusion | 40.59 million Ecu <sup>(1)</sup>  |

TOTAL 204.93 million Ecu<sup>(2)</sup>

---

(1) An amount equivalent to 6% of these amounts deemed necessary may be used for exploratory research.

(2) An amount of Ecu 2.07 million not included in the Ecu 204.93 million is reserved, as a contribution from the specific programmes of the present decision, for the centralized action on dissemination and exploitation of results.

ANNEX III

**Rules for implementing the programmes and activities  
for dissemination and exploitation of the results**

1. The Commission, assisted by the board of governors of the Joint Research Centre, shall implement the programmes on the basis of the scientific and technical objectives and content described in Annex I.

2. The rules for implementing the programmes, referred to in Article 3, comprise research and technological development projects and accompanying measures.

The projects shall be the subject of research and technological development performed in the relevant Institutes of the JRC (Joint Research Centre).

3. The Institutes of the JRC shall endeavour, whenever feasible, to execute the projects in proper collaboration and in concert with national research bodies in the Member States. Particular attention will be paid to associations with industry, notably with small and medium sized enterprises in collaborative schemes around the projects. In the same way, research bodies established in Third Countries having concluded international agreements or contracts with the European Community in accordance with Article 101, may also collaborate on the projects.

4. The accompanying measures shall include:

- the organization of seminars, workshops and scientific conferences;
- the activities of internal coordination, including the organization of particular internal centres, which ensure homogeneity of the approach and a unique common interface to the users of and partners in the projects;
- the activities of specialized training with accent on multidisciplinarity;
- a system for information exchange;
- the promotion of the exploitation of the research results
- the scientific and strategic independent evaluation of the performance of the projects and the programmes.

5. The dissemination of the knowledge gained through the realization of the projects will be done on the one hand by the programmes themselves, and on the other hand by the centralized action as described in Article 4 (3) of the decision 90/211/Euratom/EEC.

**Proposal for a  
COUNCIL DECISION**

of .....

**adopting a supplementary research programme to be implemented  
by the Joint Research Centre for the  
European Atomic Energy Community**

**(.../.../Euratom)**

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

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 consultation of the Scientific and Technical Committee<sup>(1)</sup>,

Having regard to the opinion of the European Parliament<sup>(2)</sup>,

Having regard to the opinion of the Economic and Social Committee<sup>(3)</sup>,

Whereas, in the context of the common policy relating to the field of science and technology, the research programme is one of the principal means whereby the European Atomic Energy Community can contribute to the safe use of nuclear energy and to the acquisition and dissemination of information in this field,

HAS ADOPTED THIS DECISION:

**Article 1**

The supplementary programme on the operation of the HFR (high flux) research reactor, hereinafter referred to as 'the programme', of which the objectives are given in Annex I, is hereby adopted for a period of four years, starting on 1 January 1992.

**Article 2**

The funds estimated as necessary for the execution of the programme amount to 79.0 million ECU. An indicative breakdown of this amount is given in Annex II.

**Article 3**

The Commission, assisted by the board of governors of the Joint Research Centre (JRC) shall be responsible for carrying out the programme and, to this end, shall call upon the services of the JRC.

-----  
(1) OJ No C  
(2) OJ No C  
(3) OJ No C

*Article 4*

The Commission shall decide on the terms of reference of the board of governors.

*Article 5*

1. The Commission shall each year, before 31 March, submit to the European Parliament and the Council a report on the implementation of this Decision.

2. This report shall be accompanied by the observations of the board of governors. The board of governors may also submit through the Commission to the European Parliament and the Council a separate report on any aspect of the implementation of this Decision.

*Article 6*

This Decision is addressed to the Member States.

Done at .....

*For the Council*

*The President*

## ANNEX I

### Scientific and technical objectives

The principal objectives of the programme are:

1. The safe operation of the HFR (High Flux Reactor) in Petten. This comprises routine operation of the facility for more than 250 days/year, fuel cycle management and safety and quality management.
2. Efficient utilization of the reactor in a wide scope of topical sectors: irradiation testing of materials for fission reactors, as well as for future thermonuclear fusion reactors, neutron applications to solid state physics and materials sciences investigations, radioisotope production and related activities, neutron radiography as a non-destructive testing method, and treatment of certain types of cancer with neutrons (BORON Neutron Capture Therapy) and related research.

ANNEX II

Indicative breakdown of resources for the HFR

The resources to be contributed to the supplementary programme are broken down as follows:

|                              |     |
|------------------------------|-----|
| Federal Republic of Germany: | 50% |
| Netherlands:                 | 50% |

Other resources are provided for, in addition to the supplementary programme, either under the heading of work carried out as part of the JRC specific programmes or under the heading of contractual work.

The indicative breakdown is as follows:

- Supplementary programme:
  - (a) Exploitation of reactor
    - Federal Republic of Germany: 34.5 million Ecu
    - Netherlands: 34.5 million Ecu
  - (b) Preparation of experiments (studies, rigs, etc.):
    - Federal Republic of Germany: 10.0 million Ecu
    - Netherlands: p.m.<sup>(1)</sup>
- Total appropriations 79.0 million Ecu + p.m.
- JRC specific programmes and contractual work for external third parties p.m.

---

(1) Work to be carried out directly by the Netherlands, the equivalent of such work valued by the Commission at Ecu 10.0 million.

## **TECHNICAL ANNEX**

# **SCIENTIFIC-TECHNICAL WORK**

**This work is presented Institute by Institute.**

## **CENTRAL BUREAU FOR NUCLEAR MEASUREMENTS (CBNM)**

### **I. OBJECTIVES**

The activities of the Central Bureau for Nuclear Measurements (CBNM) are dedicated to the promotion of European standards, reference data and materials needed by users in the nuclear and non-nuclear fields. In the nuclear field, the activities continue to fulfil the obligations laid down in the EURATOM Treaty and to meet the necessity to maintain in and for Europe an independent, specialized institute for prenormative research on nuclear measurements.

During the years the Institute has evolved into a high-standing laboratory known worldwide for its concept of the search for the true value with the highest accuracy possibly attainable with reasonable efforts.

### **II. 1992 - 1994 ACTIVITIES**

The Institute's activities will be pursued in the following fields:

- preparation, characterisation, certification of samples e.g. bulk samples for targets of elements, alloys, compounds as reference materials for nuclear and other industries or thin layers as reference samples for electronic and chemical industry, or special reference biological materials for trace metal analysis;
- long-lived or stable isotope Mass Spectrometry, in particular for the development and application of Isotope Dilution Mass Spectrometry (IDMS) e.g. for improved analysis in different parts of the nuclear fuel cycle or, for accurate isotope composition or ratio measurement in the frame of atomic weight determination (National Institute of Standards and Technology (NIST), Physikalisch-Technische Bundesanstalt (PTB), International Union of Pure and Applied Chemistry (IUPAC));
- nuclear data measurements and evaluation applying the high energy resolution neutron sources available (Linear Accelerator (LINAC), 7 MeV Van de Graaf (VdG) e.g. fission, fusion and standard application neutron reaction cross-sections, upon request from national or international organisations (Commissariat à l'Energie Atomique (CEA), Organization for Economic Cooperation and Development (OECD), International Atomic Energy Agency (IAEA), EC Task Force for "European Fusion File");
- radionuclide metrology e.g. for intercomparisons upon request from international bodies (Bureau International des Poids et Mesures (BIPM), International Committee for Radionuclide Metrology (ICRM)) or for application in non-destructive testing of conditioned waste;
- applied radiation techniques adapted to the existing accelerators e.g. for using neutron and particle beams for irradiation/radiation damage studies of biological/semiconductor materials and for microbeam analysis of surfaces and reference aerosol filters;
- new and non-nuclear activities are expected to further develop in the fields of chemical analysis with improved accuracy due in part to the convincing potential of isotope specific methods like mass spectrometry, of microbeam analysis of surfaces or thin layers and, in particular, in the field of



applications of the linear accelerator for transition or channelling radiation. Indeed the installation of a multipurpose equipment to generate X-rays with strongly enhanced intensity in the few keV region by transition radiation, and the production of hard X-rays in the 100 to 300 keV region with the intensity concentrated in a few discrete lines, would open up a large potential of applications, that are currently under investigation at synchrotron light sources (such as photoelectron spectroscopy, X-ray lithography, EXAFS, Raman spectroscopy, X-ray fluorescence, etc.).

### **SPECIFIC PROGRAMMES**

CBNM's work falls under the Framework Programme line "***Measurements and Testing***". The programme is executed under the heading "***Reference Materials and Reference Methods***" to be broken down into the two projects "***Nuclear and Non-Nuclear Reference Materials***" and "***Nuclear Measurements and Reference Methods***".

#### ***Reference Materials and Reference Methods***

The activities backed by the existing and modernized large facilities on site (LINAC, VdG, clean lab, mass spectrometers, computer) are of importance for the international scientific/technical research communities relying upon accurate data, reliable measuring methods and basic reference data, materials and methodologies.

For fission technology, requests are related to data evaluation (Joint European File (JEF)) or to experimental verification of fission cross sections, of inelastic neutron scattering cross sections and of resonance parameters of structural materials (Nuclear Energy Agency's Committee for Reactor Physics (NEACRP)/Nuclear Energy Agency's Nuclear Data Committee (NEANDC)). For fusion technology, important improvements are aimed at neutron data on tritium breeding, nuclear heating, activation and radiation damage. These items are requested by the EC Task Force on Neutronics for developing the European Fusion File (EFF) to serve the Next European Torus (NET). The International Thermal Experimental Reactor (ITER) project in a worldwide frame (EC, Japan, USA, USSR) coordinated by the IAEA will enhance future fusion data needs. Radionuclide metrology is dedicated to the knowledge of decay scheme data, special standards and the improvement in the application of methodologies.

The availability of high quality nuclear Reference Materials (RMs) to the international scientific research community, industry and safeguards' authorities will be guaranteed. RMs for Non Destructive Assay (NDA), solid spike RMs and reactor neutron dosimetry materials need refined preparation and to undergo characterization and certification procedures. The preparation and characterization of special nuclear targets and samples for the nuclear data research activities will be pursued.

In the non-nuclear field, the determination of atomic weights will be aiming at an ultimate accuracy. The new clean-laboratory facility will be concerned with the development and application of isotope specific analytical methods and involved in trace element determinations in complex matrices. Particle Induced X-Ray Emission (PIXE) spectroscopy, IDMS and special micro and trace element determination methods will find appropriate medical/biological research applications. The PIXE microbeam technique will be used in connection with environmental/occupational health problems.

CBNM, in addition to its work on nuclear data and nuclear reference materials and methods, also will contribute to research, development and certification

work of non-nuclear reference materials and standards for more general application in industry. This is done partly on request of the Community Reference Bureau (BCR). Other work to be executed on behalf of BCR is the organization and the management of "round robin" tests and the storage, conditioning, bookkeeping and distribution of various kinds of reference samples.

### **Human Capital and Mobility**

CBNM has developed into an world-wide acknowledged centre of excellence in the field of high accuracy measurements that attracted senior scientists from many countries and enabled young scientists to be trained by research on increasingly non-nuclear subjects.

Particular attention will be devoted to the exploration of the potential of the high performance linear electron accelerator (LINAC) for the training of young scientists in the development and application of transition or channelling radiation and to establishing a cooperation network that started already with research groups in Orsay and Lyon and is expected to be extended to research teams and laboratories in other Member countries as well.

### **SCIENTIFIC AND TECHNOLOGICAL SUPPORT FOR THE COMMISSION**

Support activities will be ongoing in the areas of safeguarding (DG I: IAEA and DG XVII: European Commission's Safeguards Analytical Measurements (ECSAM)) and of innovation transfer (DG XIII).

Special aspects of the described activities are:

- the response to international requests and needs;
- the reference character and
- the possible use in support to quality control schemes.

In general, on the basis of its activities, the Institute supports the overall harmonization policy of the Commission for the realization and the consolidation of the internal European common market starting in 1992.

### **CONTRACTUAL WORK FOR EXTERNAL THIRD PARTIES**

The efforts to open a market for products based on CBNM expertise (reference data and materials) will further be developed despite the expectation of organizations in the Member States to receive data and reference materials (almost) free of charge in recognition of their countries' contributions to the Framework Programme.

In addition to the sale of nuclear reference materials for analytical measurement in the fuel cycle and the supply of various tailor-made samples and target, there is an increasing number of requests for the preparation and characterization of non-nuclear samples, e.g. trace analysis in inorganic or organic matrices.

Applied radionuclide metrology is increasingly used, e.g. for solving problems of radioactive waste management or for the determination of reactor neutron fluences.

Utilisation of accelerator radiation ("selling beam time") for customers is becoming increasingly important by irradiating biological or new (semi-

conductor) materials in well defined particle beams. Conventional and micro techniques for surface analysis are offered to industry and research institutes.

Training courses on CBNM specific subjects (i.e. isotope mass spectrometry, application of reference materials, quality control, metrology and data evaluation) are considered to further promote in Europe and worldwide the awareness of the necessity of using common reference data and materials.

## INSTITUTE FOR TRANSURANIUM ELEMENTS (ITU)

### I. OBJECTIVES

Thanks to its highly specialized installations, to the expertise of its staff and to the fact that it is in possession of one of the rare licences to handle large amounts of radioactive materials, the Institute for Transuranium Elements has a well defined mission and can be considered as a model case for community research. Its technological research programmes deal principally with nuclear safety matters (safety of nuclear fuels, characterisation of radioactive waste, nuclear safeguards and management of fissionable materials, safety of handling nuclear materials). It collaborates closely with a large number of academic and industrial research establishments in Europe and overseas and performs contractual research for industry and services to the Commission services.

The Institute for Transuranium Elements will continue to be one of the few centres in the world where general knowledge on the chemical and physical properties of the transuranium elements, their toxicity, their environmental effects and the measures to bring the latter under control, as well as on their technical applications, is systematically collected by specialists in the field and kept readily available for broad use by the scientific and technological world.

### II. 1992 - 1994 ACTIVITIES

#### SPECIFIC PROGRAMMES

The Specific Research Programme of the Institute for Transuranium Elements will remain entirely nuclear-safety oriented. It will concentrate on the *Safety of Actinides in the Nuclear Fuel Cycle*, the name of its 1992-1994 Specific Programme.

While fuel development work for advanced power reactors will be decreased to a minimum level (compatible with the need to maintain competence in the field) and studies of certain aspects of reprocessing will come to an end, investigations in the field of nuclear waste management will gain considerably in importance, with an accent on the characterisation of unprocessed spent fuel waste forms. Fuel pin codes developed in the past years at the Institute will be applied to a wide range of scenarios, and theoretical and experimental studies on the fission product inventory (source term) and on release mechanisms will be stepped up, partly in conjunction with the international PHEBUS PF project. The effect of high burn-up on the life expectancy of a fuel pin is of large interest and requires extensive studies, especially on the evolution of fuel chemistry at increased burn-up (High Burn-Up Chemistry).

Studies to improve and automate destructive analytical techniques for safeguards work will be stepped-up and an intensified effort applied to the adaptation of existing methods to non-destructive analysis of spent fuel for fissile material accounting purposes.

Taking into account the ever increasing amounts of transuranium elements which have to be dealt with year by year, the study of their basic physical and chemical properties, their radio-toxic potential, their possible interaction with the environment, represents an important aspect of the nuclear fuel cycle and must be further elucidated.

Basic actinide research, as it has been carried out successfully at the Institute over the last twenty years, provides an important contribution to world knowledge on the subject and will be maintained.

Some key elements of the ITU programme will be:

- Study of structural phenomena affecting in-pile performance and life-time of fuel in a reactor; Measurement of thermochemical and thermophysical parameters of irradiated fuel materials;
- Studies of methods of aerosol abatement and of size-dependent transport of radioactive aerosols in ducts and chimneys;
- Experiments to recover minor actinides from specially prepared fuel samples; Improvement of the efficiency of lanthanide/actinide separation processes; Improvements in the determination of cross sections for actinide transmutation;
- Quality control of waste forms as a function of fabrication parameters; Further development and improvement of destructive and non-destructive techniques for the determination of radionuclides in waste forms; Extension of analytical techniques to "exotic" waste forms; Development of tomographic methods for waste form characterisation; Organisation and participation in Community exercises for evaluating non-destructive techniques to be applied to studies of the behaviour of radionuclides in waste forms;
- Setting up of an intelligent data base for predicting the chemical and physical properties of hitherto unknown actinide compounds in order to "tailor" them to the needs of applications and fundamental research; Research with actinide compounds in the fields of soft and hard magnets, superconductors, heavy fermions, large Kerr effect compounds, metallic glasses; Increased use of synchrotron radiation from European and US sources for electronic and structural investigations of actinides and actinide compounds; Extension of high-pressure studies with actinides into the "virgin" range of 1 to 2 Mbar;
- Melting of ceramics or glasses by heating under levitation in an acoustic field.

For the efficient implementation of the Institute's activities set out above, it is intended to install a dedicated facility for handling the heavier actinide elements (Americium Labs).

The Institute will continue to substantially contribute to the programme on Radioactive Waste Management with studies on the characterisation of vitrified high-level waste forms and of non-processed spent fuel.

Efforts will continue to improve destructive techniques for safeguards analysis in the frame of the programme on Safeguards and Fissile Materials Managements.

### **Human Capital and Mobility**

Due to its unique facilities for handling radioactive materials and an established cooperation with a large number of academic institutions in Europe and overseas, The Institute is in an excellent position to contribute to the Human Capital and Mobility programme by offering, as in the past, training opportunities to young scientists in the fields of nuclear safety and in areas related to the chemistry, the physical chemistry and the solid state physics of actinides.

### **SCIENTIFIC AND TECHNOLOGICAL SUPPORT FOR THE COMMISSION**

The Institute will continue to provide assistance to DG XVII Safeguards Directorate by analysing nuclear material samples for safeguards measures taken in various European nuclear installations, both at the Institute laboratories and on-site (at Cap de la Hague and Sellafield). The International Atomic Energy will be supported - as requested by DG I - in their efforts to refine, automate, and field-test analytical equipment for safeguards activities on an international scale.

In collaboration with DG XIII, the Institute will be active in the exploitation of research results by transferring certain equipment and techniques developed at the ITU for laboratory use (such as a multi-colour pyrometer or an ultrasonic device for aerosol scavenging) to industry for commercial exploitation.

### **CONTRACTUAL WORK FOR EXTERNAL THIRD PARTIES**

Besides performing research in specific areas defined in the Commission's multiannual Framework Programme, the facilities of the Institute and its licence for handling major amounts of highly radio-toxic materials will continue to attract national safety authorities, the radio-pharmaceutical industry, and institutions and industries concerned with ecological problems, as potential customers to carry out work ranging from the preparation of actinide compounds and radio-isotopes for medical applications to the post-irradiation analysis of nuclear fuel pins.

## INSTITUTE FOR ADVANCED MATERIALS (IAM)

### **I. OBJECTIVES**

It is being increasingly recognised that advanced materials constitute a broad, enabling technology, which allows the more effective operation of machines and structures of modern industrial society and stimulates the innovation and successful exploitation of other technologies.

Although the widespread perception of the importance of industrial materials is expressed today in work in Member States, the effort on advanced materials within the Joint Research Centre provides additionality through the European dimension and neutrality of the JRC and the opportunity to contribute to European cohesion through training and exploitation of unique installations and specialisms.

The aims of the Institute for Advanced Materials are to contribute to enhancing the industrial competitiveness and safety of components, structures and engines relevant mainly to the Energy, Transport, Environment and Manufacturing sectors, through advances in the understanding of the basic properties, the processability and engineering performance of materials.

The Institute will carry out its tasks mainly within the explicit aims of the Framework Programme, with a significant contribution to scientific and technical work in Support to the Commission as well as through industrial contractual work with external third parties.

### **II. 1992 - 1994 ACTIVITIES**

#### **SPECIFIC PROGRAMMES**

Under the Framework Programme heading "Industrial and Materials Technologies", the research will be oriented towards the following areas which derive from an extensive forward planning exercise, which have considerable potential for enhancing European technological awareness, which require sound basic scientific input, technological applications as well as a testing and pre-normative focus:

#### *Alloys and Intermetallics:*

Improvement in performance of alloys and intermetallics in extreme operational conditions as well as under interactive conditions of corrosive degradation, creep and fatigue deformation; emphasis on pre-normative features. The action should stimulate a wider awareness of the potential of new classes of intermetallic materials for future engineering application; to help steer the newly formed European Group on Structural Intermetallics and to plan together with DG XII to launch a Concerted Action in this field.

#### *Ceramics and Composites:*

Improvement in performance of structural ceramics and composites in simulated industrial environments; emphasis on pre-normative features and suitable test methodologies. A continuous ceramics fibres initiative should encourage the development and application of long, thin ceramic fibres as a reinforcement for ceramic and metal matrix composites; to build up this initiative together with the

Experts Group and DG XII with the aim of completing a future market study; to define and give birth to a new EUREKA project as a prelude to the setting up in industry of a manufacturing capability.

*Coatings and Processes:*

Development, testing and diagnostics of protective coating techniques and products. Development of new manufacturing techniques for ceramic materials and components.

Operation of joint venture on Advanced Coatings with a Dutch national laboratory (ECN).

*Surface Modification Technology:*

Improvement in materials properties - wear, corrosion, fatigue resistance - through modification of surface state using ion implantation and laser beam mixing.

*New Functional Materials:*

Innovation and testing of functional materials for environmental gas sensors and for optical and photovoltaic properties.

*Non Destructive and Evaluation Techniques of Advanced Materials and Components:*

Development of new non-intrusive evaluation techniques for ceramics, composites and thin films. Validation of NDE techniques used in the inspection of industrial critical facilities.

*Life Prediction and Reliability Technology:*

Life prediction modelling and life extension treatments on alloys and ceramics.

*Information and Data Management:*

Development of Materials Databanks, appropriate to materials processing. Training Workshops on advanced materials and initiating specific initiatives on pre-normative research where the objective is to establish a European focal point for the exchange of information and to encourage discussion between experts from all sectors of pre-normative research and development in materials, and to provide an environment suitable for the training of young scientists interested in careers in materials-related standards and their background.

In the field of ***Controlled Thermonuclear Fusion*** of the *Framework Programme*, the Institute intends to contribute through research along the following lines:

*Support to the Next Step Design:*

*Plasma facing components - thermal fatigue:* irradiation testing in HFR, experiments in the Cyclotron; elaboration of a databank on austenitic steels;

*Long Term Technical Developments:*

*Low Activation Materials:* to evolve along the lines of SiC composites; to consider chromium and vanadium and related metallurgical problems; to test potential of intermetallics;



### Human Capital and Mobility

The Institute has a long tradition of postgraduate training with success in the preparation of PhD's and has developed a network of European academic contacts. The intention is to maintain this important activity, and to expand upon it in the above fields of expertise, as well as in the use of large facilities. In particular, one will aim to provide an environment suitable for the training of young scientists interested in careers in materials-related measurement and standards.

### SCIENTIFIC AND TECHNOLOGICAL SUPPORT FOR THE COMMISSION

The Institute activities in Scientific and Technological Support for the Commission are aimed to support the development of the European industrial standards base through pre-normative scientific and technical activities. The following describes the fields for which there exists a demand from Commission Directorates General:

#### *Information and Data Management:*

Support to strategic initiatives and valorisation in Scientific and Technical Information Management; initiatives and management of pre-normative research and systems development on computerised materials data and knowledge bases in engineering materials (DG XIII);

#### *Initiatives on Standards for Ceramics and Composites:*

Support to and setting up external networks for pre-normative R & D in advanced ceramics, composites and other materials as a prelude to CEN/CENELEC standardisation (DG III). Evaluation of degradation mechanisms in catalyst carriers; development of performance inspection procedures in support of Community directives (DG VII; DG XI);

#### *Development of Codes for Nuclear Components:*

Extend the PISC exercise to the non-destructive evaluation of aged components in long serving nuclear installations: verification of NDE procedures for inspection and development of safety related codes and standards for large critical industrial installations (DG III and DG XVII).

#### *Standardisation of Radiopharmaceuticals:*

Standardisation of radiopharmaceuticals in support of Council directives concerning radio protection of medical staff and patients (DG XI).

### CONTRACTUAL WORK FOR EXTERNAL THIRD PARTIES

The Institute's *High Flux Reactor* is recognised as one of Europe's foremost multi-purpose materials research reactors and it is intended to continue to contribute to the European research effort through:

- Supplementary Programme in support of the Dutch and German S & T strategies with work on materials and fuel aspects of fission reactors and thermonuclear fusion;
- The development of Boron Neutron Capture Therapy as a technique for treating certain forms of cancer, in cooperation with the Commission

concerted action on this subject, carried out with the participation of most Member States;

- Application of neutron scattering as a diagnostic technique for materials investigations;
- Contractual work for external third parties, for example radio-isotope production, neutron radiography and silicon doping.

Since the introduction of contractual work for external third parties, the Institute has already attracted a good number of contracts, both in connection with materials technologies and also the exploitation of large facilities. The cultural transformation has taken root in the Institute and contractual work for external third parties is well accepted as an indicator of the relevance of the research and as a vital complement of research conducted under the Specific Programme.

This type of work represents a key element in future Institute planning and it is expected that contract research will continue its rapid growth path in the near future to reach a steady state and a significant proportion of the Institute's turnover.

In the materials fields, the industrial sectors which experience indicates should have a good response for contract work are: aerospace, power engineering, transport. These will continue to be targeted. For the large facilities, the Cyclotron in Ispra, following a recent long term agreement with an industrial partner, will enter into the production of medical radio-isotopes.

## **INSTITUTE FOR SYSTEMS ENGINEERING AND INFORMATICS (ISEI)**

### **I. OBJECTIVES**

To be the European Commission's centre of excellence in the field of 'complex systems' engineering, focussing on the evaluation and development of methods addressing the safety, standards and performance of systems which involve industrial, social and environmental issues on a pan-European scale.

In particular, to take the broad, 'systems approach' to the understanding of the human, societal and environmental implications of scientific, technological and industrial developments in order to provide technical advice for the balanced social and industrial development of European society.

ISEI will be launching, early in the period, new initiatives in the areas of Environmental Accident Management, Safety at Work and later, Safety Critical Computer Systems as well as a contribution to the proposed Centre for Earth Observation. ISEI's new initiatives will be built on top of the Institute's existing strengths of systems engineering orientated to safety of systems, and ISEI's underlying strength in informatics which is based both on ISEI's JRC-wide informatics service and the Institute's advanced applications work.

### **II. 1992-1994 ACTIVITIES**

#### **SPECIFIC PROGRAMMES**

##### **Environment**

ISEI activity under the Environment Programme will relate essentially to industrial safety and environmental risk management and will focus on the development of decision support systems for plant safety, emergency management and territorial risk management, including methods and approaches for modelling relevant decision processes.

ISEI will strengthen the work on the development of methodology and technology to support the assessment of the reliability and safety of industrial and technical systems by widening the scope to take into account the human and social interfaces, and the environmental compatibility. In this context, new approaches to modelling decision processes and control strategies will be developed, based on recent advances in system science and on the outcome of exploratory researches performed in the 1988-1991 programme. These objectives will be tackled in partnership with industrial and academic researchers from across Europe.

Additionally, ISEI's efforts in areas of public concern such as the environmental impact of the releases of chemicals from industrial and transport activities will lead to a major new initiative: the establishment of an Accident Management Centre, forming part of the European Office for Safety. The Centre's objective is to create, in connection with DG XI and national authorities, a comprehensive information system on accident prevention, mitigation and response, based on the best available information technology (hypermedia, expert systems, etc.) to enhance the dissemination of information on preventive measures and emergency management for industrial and transportation accidents having severe impact on the population and the environment. The Centre will provide response/rescue organizations with information and research results quickly

available to help in an actual emergency. The activity will include the development of decision support systems for environmental emergency management, education and training, post accident analyses, auditing of emergency plans for accidents having cross border impacts and studies of communicating with the public about risks taking into account cultural and legislative differences between European regions.

A further new activity of the Institute in the environmental area would be its informatics and data handling support to the Centre for Earth Observation (CEO) which is described in section 17 of Chapter I.

### **Industrial and Materials Technologies**

ISEI's second new initiative will be in the area of Safety at Work. Here, the objective will be to conduct and coordinate research activities concerning occupational and organisational aspects of the working environment as well as prevention and management of accidents. The work will have two main thrusts: the organisation of an information and documentation service concerning EEC regulations and norms plus occupational accidents statistics and analyses developed by the Member States; and the establishment of a laboratory of human-machine systems interaction which will, by simulation and experimental studies using real domains, evaluate the impact of new technologies on safety at work (computerised diagnostic systems, robots, distributed decision making and communication, cognitive models in use by industrial designers) and research on cognitive and organisational factors affecting the development of a safety culture in the work place.

### **Measurement and Testing**

ISEI will perform specific prenormative research in the field of probabilistic residual life prediction of structures. The activity will be centred around existing specialized installations such as STRIKE (Structural Reliability Investigation by Knowledge Engineering) where integral testing on complex structures can be performed.

The existing work on the development and validation of probabilistic codes and expert systems for the evaluation of the lifetime of steel and composite structures (pressure vessels, offshore platforms, steam headers) will be extended to consider a larger variety of operational conditions and environments (e.g. marine environment).

The specific research on non-intrusive synoptic methods for diagnostics (optical diagnostics by coherent light and image processing) will be scaled-up to assess its full potential in industrial applications.

To respond to the needs of the photovoltaic industry, the European Solar Test Installation (ESTI) focusses on prenormative research in the field of photovoltaic systems with the development of measurement techniques for thin-film and high efficiency devices.

Work in support of the preparation of new standards will put emphasis on reliability of grid-connected photovoltaic systems in buildings as well as on high-value applications. The projects are selected in line with the marketing strategy for contractual work for external third parties.

## **Nuclear Fission Safety**

### **Reactor Safety**

The existing activities of ISEI on risk and reliability evaluation will be oriented towards the development of methodology and technology to assess in time the "level of safety" of an aging plant, and at optimising maintenance and control. This includes the integration into the methodology of the consideration of the change of the component reliability, of the modification of in-plant configuration and operation, of the aging of structural parts, of the transfer of knowledge between subsequent generations of operators and of changes of man-machine interfaces. "Living PSA" techniques, incorporating knowledge based systems, will be developed. The effort on the System Response Analyser will be continued with particular reference to human behaviour modelling, taking into account the changes in man-machine interfaces, e.g. the possible introduction of novel types of supervisory systems for the management of accidents.

Moreover, a benchmark exercise on expert judgment elicitation and combination is planned.

### **Safeguards and Fissile Materials Management Programme**

The activities in *Safeguards and Fissile Materials Management* will cover two main areas:

- ***Development of Containment and Surveillance Techniques (C/S)***

C/S techniques are expected to play a much larger role in the implementation of nuclear safeguards than in the past because of the changing fuel cycle characteristics in terms of size and level of process automation.

They are based on sealing and identification techniques and on optical surveillance and monitoring techniques.

- For sealing and tagging of items and containers, there should be wide application of some techniques (based on ultrasonic and surface topography) presently developed and demonstrated on spent fuel containers, etc.
- Multisensor systems based on C/S are now being introduced on an experimental basis and demonstrated in nuclear facilities. Further development of such systems with the appropriate data management is required, in particular for video data reduction and analysis of images.
- Demonstration and Performance assessment of existing and new C/S devices and development of new procedures will be performed in the new LASCO laboratory, including the computer aided tele-operation for remote inventory verification in a model of an advanced storage area.

- ***Integration of Safeguards Measures***

The need for development and support activities is conditioned by the evolution of the nuclear fuel cycle, the new safeguards strategies designed to respond to this evolution and the overall pressures of resource limitations. A careful monitoring of the above parameters will be made in order to make a more clear and systematic forecasting of safeguards needs

and identification of research requirements and to integrate the development work in other areas.

Furthermore, specific data evaluation methods will be developed and applied to assess the performances of multisensor measurement systems, for instance, for the determination of nuclear materials in large tanks.

### **Controlled Thermonuclear Fusion**

The present contribution to the European Fusion Programme concerns the pre-design activity in support to the Next Step (NET/ITER), as well as exploratory studies for the long term development of fusion. In the 1992-1994 period ISEI will devote the largest part of its activity in support to the Next Step design (Area 1 of the European Fusion Programme Proposal for the period 1990-1994).

Design work on components of the Next Step will be carried out under specific request of the NET-Team. The areas of contribution are:

- structural analysis of plasma facing components during plasma disruption events, including validation of the codes used for this purpose;
- Safety analysis of in-vessel components.

Technological actions will be focused on the construction of mock-ups of in-vessel components of the Next Step and tests of remote handling procedures to bring the Remote Handling Equipment to the required level of confidence for fully remote operation in the reactor. This work will be a continuation of the present activity dealing with simulation of remote handling of a 1/3 mock-up of the blanket handling device (TELEMAC laboratory).

In the field of **Long-Term Technical Developments** (Area 2 of the European Fusion Programme), ISEI could, if requested, contribute to the reference design of a commercial fusion reactor to be undertaken in Europe. This contribution would cover, in particular, the safety and environmental problems - an area where a relevant know-how exists in the Institute.

Work for JET will be done under specific request.

### **Human Capital and Mobility**

ISEI will participate in the **Human Capital and Mobility** programme via 'networks of excellence' built from cooperation between the JRC and national institutions. In particular, ISEI will focus its training and research programmes for young researchers towards two themes: risk management and advanced computing techniques. ISEI is well known for its risk assessment and accident management research and in this area acts as a focal point of various networks of industrial and academic institutions. Moreover, ISEI is a centre for advanced (parallel) computation, being part of DG XIII's drive to exploit Europe's innovative lead in the area of transputer applications.

### **SCIENTIFIC AND TECHNOLOGICAL SUPPORT FOR THE COMMISSION**

The scientific/technical support to the Commission's services for the period 1992-94 will address the requests coming from nine Directorates General and will cover various scientific disciplines available within ISEI. This activity is a large and very important component of ISEI's work.

The activities may be summarised as follows:

- a) development and analysis of computerised information systems for:
  - management of control systems (for the coordination of Fraud Prevention Unit) and management of parliamentary petitions (Secretariat General);
  - world shipbuilding (DG III);
  - aircraft incidents (DG VII);
  - civil protection for cooperation and mutual assistance in case of disaster (DG XI);
- b) support for the implementation of EC directives notably on major accidents (DG XI);
- c) Valorisation of R/D results (DG XIII). As is the case for the other Institutes, the ISEI is also involved with DG XIII for the exploitation and dissemination of research results. Current projects at the Institute are:
  - object identification by surface texture;
  - on high speed camera holography and image processing;
  - support to CORDIS data bases on Community research and technological development activities.
- d) development of information systems and containment and surveillance techniques for inspectors of the IAEA (DG I) and of the Safeguards Directorate (DG XVII);
- e) support to DG XVII demonstration programmes, notably in the photovoltaic area while energy savings and energy conservation support will be gradually phased out;
- f) support activities for the information technology programmes of DG XIII, with a particular emphasis on technology demonstration and 'applications pull' activities such as:
  - application of software and knowledge engineering R/D results;
  - application of parallel computing R/D results;
  - training support;
  - pilot networking project.

Support is also provided to the Statistical Office by assistance with the development of new methods of data analysis.

The Support to the Commission areas which are expected to expand are the activities for the information technology programmes (point f), the implementation of EC directives (point b) and proposals are also being made in the field of safety at work (DG V).

### **CONTRACTUAL WORK FOR EXTERNAL THIRD PARTIES**

ISEI marketing policy will be mainly based on its accumulated know-how and recognized competence in developing methods and tools for industrial safety and environmental risk assessment and management, backed up by a strong informatics expertise. In this area, a particular perspective is open by the possibility of participating in projects of national or regional public interest and funded at regional or national level. This should include provision of informatics and other support to the European Environment Agency.

Development initiatives undertaken (e.g. Eureka projects or associative projects like STARS) jointly with industrial partners in the 1988-1991 programme should lead to commercial exploitation in the period 1992-1994.

An additional potentially significant contribution to the contractual work for external third parties income should derive as a spin-off of the expertise continuously developed in the frame of the Framework Programme in the area of advanced diagnostics, systems performance assessment and systems physical protection.

The possibility of valorizing the European Solar Test Facility (ESTI) in the frame of a commercial initiative, that could cover the full operation cost will also be explored.



## ENVIRONMENT INSTITUTE (EI)

### **I. OBJECTIVES**

The existence of man is intrinsically connected to his environment via biogeochemical cycles which in turn, are affected by material and energy cycles. Environmental research, i.e., research relating to the living conditions of man and its changes in view of assessing the possibilities and limits of science and technology in their endeavour to conserve or regenerate the natural bases of human life, is the first member of the logical chain environmental research - environmental policy - measures of environmental protection - environmental conservation.

Environmental research at the JRC started in 1972. It offered, and is continuing to offer, multidisciplinary R&D approaches for the clarification and description of environmental stresses and, in particular, those relative to global environmental changes, reduction of pollutant emissions, toxicological and ecotoxicological effects of environmental chemicals.

An increasing percentage of its efforts is dedicated to technical and scientific support to other Commission services dealing with environmental matters. This support includes methods for chemical analysis in the air, water, waste and food sectors, and the development and maintenance of data banks and modelling activities.

Major achievements were e.g. in the fields of pollution abatement technologies (development of a new flue gas desulphurisation process), environmental chemicals (establishment and evaluation of an inventory of industrial chemicals on the European market), the elucidation of the origin of lead in human blood and a post-event comparison of the evolution of the Chernobyl cloud and radioactive deposition.

The scientific disciplines represented in the Institute are (in decreasing numbers) chemists, physicists, mathematicians (modellers), biologists, biochemists, information scientists, geochemists, meteorologists, chemical and nuclear engineers.

### **II. 1992 - 1994 ACTIVITIES**

#### **SPECIFIC PROGRAMMES**

The research activities envisaged for 1992-94 of the Environment Institute match the Framework Programme themes "***Participation in Global Change Programmes***" (with a natural emphasis on strong cooperation between laboratories in the Member States and worldwide), "***Technologies and Engineering for the Environment***" and "***Working Environment***". Within these themes the activities of the EI concentrate on the following subjects of research:

Three activities of the Institute deal with aspects of "***Global Change***":

- ***Physics of the Atmosphere***. It deals with modelling of atmospheric transport of pollutants at regional, European and, in collaboration with the Safety Technology Institute, at global level. The emphasis is on intercomparison and validation of existing models and improving links with experimental input data.

The main experimental means are an aerosol laboratory for the study of gas/particle interactions and advanced equipment for the use of inert atmospheric "tracers", which follow the trajectories of air masses the same way as air pollutants do. Within the framework of the Eureka/Eurotrac-Tract project, first results show that pollutants can well climb the steep slopes of the Alps and cross the central Alpine spine.

- *Chemistry of the Atmosphere.* The scope is to examine the chemical fate of biogenic and anthropogenic emissions by studying the kinetics and mechanisms of their transformation with relevance to the generation of noxious compounds and the build-up of radiatively active gases in the troposphere. A part of the activities lies within the framework of the COST 611-Eureka/Eurotrac-Lactoz project. Sidelines are the monitoring of pollutants on a local and regional basis and the development of abatement technologies for pollutants from power stations (desulphurisation, denoxing and their combination).
- *Biosphere-Atmosphere Interactions.* The focus is on the deposition/emission exchanges of substances from different vegetation types and their reactions in the near-to-surface atmosphere. Particular attention is given to their role in the Mediterranean areas and their contribution to the formation of ozone over Europe. In this field of biosphere/atmosphere interactions there is a collaboration with the Institute for Remote Sensing Applications which focuses on marine and large area aspects.

The activity contributes to the Eureka/Eurotrac-Biatex project and to the IGBP-IGAC project.

Three further activity areas concentrate on *Environmental Chemicals*:

- *"Soil, Waste, Water"* which originates from radio-chemical research activities and combines the expertise of soil chemists, geologists and modellers acquired in research on radioactive waste disposal to study the migration and transformation of organic and inorganic pollutants which could reach the ground- and surface waters. The influence of humic substances and natural colloids on mobility is particularly considered.

The development of a mobile laboratory for in-field analysis of contaminants in soil, water and chemical waste is under development in the framework of the Eureka/Euroenviron project. Further activities are expert systems for the management of toxic and hazardous wastes and the development of specific analytical methods for persistent organo-chlorine compounds in soils and waters.

The above activities will be strongly focussed on the area of chemical wastes and their disposal.

Activities on water quality include two projects focussed on the Mediterranean area and developed in collaboration with different European laboratories. The first one on microphyte toxins (MITO project) aims at the development of fast and easy-to-use systems for the characterization, identification and quantification of algal blooms in fresh and marine waters. The second one on analytical quality control aims at the detection, quantification and reduction of error sources associated with the sampling and analysis procedures for environmental micro contaminant monitoring.

- *Life Sciences.* Work is focused on the evaluation of toxicological and ecotoxicological effects of environmental chemicals in four directions:

- (a) experimental activities on trace metals and genotoxic compounds including new in-vitro and in-vivo test systems;
- (b) biomonitoring of trace metals for the establishment of background values and risk groups in human populations in Europe;
- (c) risk evaluation of environmental chemicals using methods of quantitative structure-activity relationships and closely related to this activity
- (d) updating and distribution of the ECDIN data bank.

Activity (b) is part of the Eureka -Euroenviron project. Activities (a), (c) and (d) are related to technical support to DG XI for the evaluation of existing chemicals and the updating of EC directives on chemicals and some exploratory research.

- *Indoor Pollution.* There are two closely related lines of action:

- (a) Experimental activity aimed at assessing human exposure to a broad range of organic pollutants originating from indoor sources and its contribution to total exposure, identification and characterization of indoor sources and development and validation of related methods;
- (b) Management and Technical Secretariat of the Concerted Action "Indoor Air Quality and Its Impact on Man" establishing a 'Europe-wide' collaboration in this field.

The activity *Environmental Informatics* deals with problems related to the real or potential presence of harmful compounds in the environment including their impact on humans and the different environmental compartments. It includes the diagnosis and trend of the environmental contamination by making use of pollution environmental data, pollution environmental indices, toxicological data, dispersion, transport and migration models from the other activities of the Institute. Work is done in collaboration with the ISEI Institute.

Several of the activities mentioned here or above in the area of global change could be concentrated towards a substantial contribution, to the initial phases in 1992-1994 of the Centre for Earth Observation as described in section 17 of Chapter I.

### **Human Capital and Mobility**

An important role of the Institute lies in the further education and training of young scientists with research aspirations in environmental science and technology. The Institute, with its established collaborations with networks of national laboratories thus intends to contribute in an essential way, to the aims of training of young researchers under the Human Capital and Mobility Programme.

### **SCIENTIFIC AND TECHNOLOGICAL SUPPORT FOR THE COMMISSION**

The scientific and technological support to the Commission responds to the requests of DG XI to support the implementation of present and future EC Directives on Air Quality, Water Quality, Chemicals and Chemical Waste, under the headings *Physics of the Atmosphere*, *Chemistry of the Atmosphere* and *Soil, Waste, Water*, respectively. Activities on indoor air pollution will include work requested by the Consumer Policy Service.

The evolution of radioactivity in the environment both under normal conditions and in the case of nuclear emergencies is also studied to support the DG XI obligations on radiological protection.

The activity on *Food & Drug Analysis, Consumer Protection* is performed essentially by request of DG III, VI and the Consumer Policy Service, on reference methods for the detection of origin, genuineness, adulteration and food fraud (e.g. fruit juices, dairy products and wine, for which a data bank will also be set up) and looks after the purity of raw materials used in medicines. In addition to this work, requests from the Consumer Policy Service include safety-related evaluations on cosmetics, food products and a data bank on safety aspects of a wide range of products. Furthermore, analytical work is routinely performed for DG XXI.

The setting-up of A *Centre for Validation of Alternative Testing Methods* (i.e. alternative to animal tests in toxicology) requested by DG XI within the frame of the Institute by making use of the existing toxicological laboratories, the multidisciplinary scientific support and the experience gained in the validation of analytical methods and in the operation of data banks.

The main task of the Centre will be the coordination, at Community level, of the validation of alternative testing methods by establishing analytical protocols and intercomparison exercises.

As a complement to this, the Centre should favour the exchange of information by setting up and operating a data bank on alternative testing methods and promoting meetings and workshops in order to facilitate dialogue between industry, associations for animal protection and regulatory bodies.

#### **CONTRACTUAL WORK FOR EXTERNAL THIRD PARTIES**

Contractual work is developing for public authorities and industry notably in the areas of air pollution, water quality, chemical industrial waste and evaluation of toxic substances.

The Environment Institute has already contributed to the Task Force for setting up the European Environment Agency and plans are being drawn up for substantial support on the harmonisation of analytical methods, intercalibration of instruments, standardisation of data formats, development of new environmental measurement methods and instruments, as outlined in the Annex of the Council Regulation on the establishment of the European Environment Agency.

## **INSTITUTE FOR REMOTE SENSING APPLICATIONS (IRSA)**

### **I. OBJECTIVES**

The objectives of IRSA are:

- a) to evaluate and demonstrate possible applications of remote sensing in support of the sectorial policies of the Commission;
- b) to undertake research on advanced methods for the interpretation and utilisation of satellite data, including their integration with geographical data;
- c) to help stimulate the scientific community in the use of satellites (a role complementary to the mission of the European Space Agency (ESA)). This objective should be carried out via collaborative programmes and pilot projects of European significance.

Within this context, IRSA takes part in all four JRC tasks and furthermore serves as a focal point for the management of other European or Community projects, such as TREES and EARSEC.

### **II. 1992 - 1994 ACTIVITIES**

#### **SPECIFIC PROGRAMMES**

The specific programme will contribute to the Framework Programme objectives of the Environment line, and notably to the themes "*Participation in global change programmes*" and "*Technologies and engineering for the environment*". This includes the following research:

#### ***Environmental Mapping and Monitoring***

This research activity is aimed at the development of techniques for the application of data derived from high resolution earth observation satellites, in conjunction with collateral data and information, for the monitoring and management of marginal (less favoured) areas of the European Community.

The activity incorporates the development of advanced image interpretation techniques, including the use of artificial intelligence and neural networks in conjunction with geographical information systems in order to improve land use classification.

#### ***Global change***

Two major contributions to the study of global change are to be developed.

- *Monitoring of the Marine Environment.* Global Change studies related to the marine environment will concentrate upon studies of the temporal and spatial variability of sea surface temperature, ocean colour, biological activity and associated bio-geochemical fluxes in the North-East Atlantic. Within this activity the development and validation of numerical models of the area will be undertaken (see also the S/T Support Commission study, OCEAN).

- *Processes Related to Large Scale Changes in Terrestrial Ecosystems.* The principal objective of this work is to develop approaches to the study of changes in terrestrial vegetation canopies at regional to global scales using remote sensing data. In so doing, it is intended to model the interactions between terrestrial surfaces and the climate in order to better understand the possible impacts of change in the biosphere-atmosphere coupling.

### ***Technologies and Engineering***

Evaluation of a number of advanced techniques which will become important in the future as new earth observation systems are developed. These advanced techniques include:

- a) Microwave remote sensing
- b) Imaging spectrometry
- c) Data processing

Each of these are described in more detail below:

- *Microwave Remote Sensing.* The objective of this work is to undertake signature research in the microwave region of the electro-magnetic spectrum via laboratory, airborne and spaceborne techniques, in order to improve the knowledge of the status and dynamics of ecosystem components. Particular emphasis will be given to the implementation and use of a signature laboratory, the implementation of a European programme for airborne remote sensing experiments, the application and interpretation of ERS-1 data, and to the development of advanced techniques of information extraction from microwave data.
- *Imaging Spectrometry.* This activity will evaluate the potential of high spectral resolution data for use in land resources applications, land degradation and soil erosion processes. Atmospheric, bi-directional and polarization effects will be evaluated.

In addition, field radiometry will be applied in an evaluation of water, plants and the atmosphere; this will include the organisation of radiometric ground data campaigns in order to calibrate airborne and space sensors and to validate atmospheric corrections and classification algorithms.

- *Data Processing.* Data processing techniques will be developed to handle data from advanced sensors, such as imaging spectrometers and radars. Methodologies will also be developed to include advanced image interpretation techniques using artificial intelligence and neural networks and processing imaging spectrometry data.

### **Human Capital and Mobility**

The Institute, being involved in the implementation of a new and advanced technique like observation of the earth from space, is particularly adapted to the training of young scientists in the field. Through a network with national teams and laboratories the areas for this training can be:

- microwave signature
- high resolution spectrometry
- expert systems applied to spaceborne data processing
- development of geographical information systems
- thematic applications of remote sensing

## **SCIENTIFIC AND TECHNOLOGICAL SUPPORT FOR THE COMMISSION**

### **Agriculture**

Two studies will be undertaken in the field of agricultural policy:

- *Common Agricultural Policy (Agriculture, DG VI) and the Statistical Office (EUROSTAT): Pilot Project of Remote Sensing Applied to Agricultural Statistics.* The objective of this work is to develop and demonstrate, up to the semi-operational scale, methodologies which integrate remote sensing data into the collection of statistics of crop acreage and agricultural production in the CEC.
- *Common Agricultural Policy (DG VI, FEOGA): Integrated System of Agricultural Subsidy Control based on Area Declaration.* In order to support operational applications in agricultural subsidy control related to the declaration of areas under crop, for durum wheat, cotton, olive trees, set-aside land and vineyard removal, as well as vineyard and citrus registers, airborne and spaceborne remotely sensed data will be integrated in a complete system which will reduce the quantity of fieldwork and also reduce the subjectivity of the control decision.

### **Tropical Vegetation Monitoring**

Two studies will be undertaken involving the monitoring of tropical vegetation:

- *Development Policy (DG VIII): Application of Remote Sensing to the Monitoring of Tropical Vegetation.* The objective of this work is to continue the development of remote sensing techniques in the monitoring and forecasting of foodcrop production in West Africa, the evaluation of the impact of vegetation conditions upon water resources in West African river basins, and to undertake an inventory of tropical forests and deforestation on a global scale (see also Specific Programme, Global Change).
- *External Affairs (DG I): Detection of Narcotic Plants* A feasibility study regarding the potential detection of narcotic crops (coca, poppy) using remotely sensed data will be undertaken for specific sites throughout the world.

### **Marine Environment**

Two studies will be undertaken including the marine environment:

- *External Affairs (DG I): Applications of Remote Sensing to Marine Productivity.* The application of remote sensing data, in conjunction with conventional oceanography and meteorological data, will be evaluated for the study of coastal upwelling and fishery management off the Northwest African coast (see also the Specific Programme, Global Change).
- *Environment (DG XI): Ocean Colour European Archive Network (OCEAN) Project.* OCEAN, a joint initiative of IRSA and ESA, aims at a thorough reappraisal of all ocean colour data derived from the Coastal Zone Colour Scanner (CZCS) on seas of European concern, and at their exploitation for an improved understanding of marine environmental issues (reference should also be made to the Specific Programme, Global Change).

### **Land Use**

- **Environment (DG XI): Corine Land Cover.** The objective of this ongoing study is to implement methods to update the Corine land cover database using existing methods developed under the S/T Support Commission study on Agricultural Statistics, and new methods incorporating automatic classification techniques to permit regular updating.

### **CONTRACTUAL WORK FOR EXTERNAL THIRD PARTIES**

The contractual work for external third parties comprises the developments, implementation and testing of the lidar fluorosensor on a helicopter-based platform in cooperation with an industrial firm. The Institute also plans to make available to outside third parties, its specialised scientific installations, such as the radar signature laboratory. Its planned support to the European Environment Agency, notably by the application of remote sensing techniques, will be included under this heading.

### **Cooperation with ESA**

In addition to the OCEAN project, the Institute is implementing two other European projects:

- **Tropical Forest Monitoring (TREES).** The TREES Project, jointly undertaken with ESA, will develop a satellite-based methodology for a continuous monitoring of the tropical forest at global levels using AVHRR and ERS-1, SAR data (see also Specific Programme Global Change).
- **European Airborne Remote Sensing Capabilities (EARSEC).** The objective of this work, jointly undertaken with ESA, is to establish a European capability for carrying out airborne remote sensing campaigns. This capability incorporates sensors, aircraft and processor, and includes the development of these facilities to JRC specifications.

Several of the activities of the Institute both under the specific research programme and other headings, could be concentrated on a shorter term and a longer term basis around the Centre for Earth Observation (CEO) to be established at the JRC through a collaboration inside with the other relevant JRC Institutes (EI and ISEI) and outside the JRC with ESA and national authorities.



## SAFETY TECHNOLOGY INSTITUTE (STI)

### **I. OBJECTIVES**

The Institute's role in the context of JRC activities is to contribute to the understanding of complex physical and chemical phenomena and the development and validation of calculational tools in areas which are of particular concern for the public at large such as safety of nuclear and non-nuclear installations, environment, waste treatment of nuclear materials and safeguards. Experience shows that due to the complexity and severity of problems, reference solutions have to be prepared at European level which make best use of available experience in the Member States.

The approach to the problem conducted by the Institute is deterministic in nature and has to be seen as a logical complement to the probabilistic and system frame which is being developed by the Institute for Systems Engineering and Informatics. Coordination of the two approaches is guaranteed by the European Office for Safety described in the introduction chapter, section 14.

STI is keen to keep a balanced approach between experimentation and theoretical analysis. For particular purposes unique facilities are designed, constructed and operated. Member States are invited to make extensive use of these expensive installations in order to avoid similar expenditures in their home organisations and draw the benefits from well coordinated programmes executed at Commission and national level.

### **II. 1992 - 1994 ACTIVITIES**

#### **SPECIFIC PROGRAMMES**

The Institute's contribution to the Measurement and Testing programme will be centred around the Reaction Wall facility that is designed to test full scale structures to seismic and other loadings and can be used to help define norms and standards particularly in the civil engineering industry. It is fully complementary to smaller scale shaking tables in Member States. The analysis and experimental activities are part of a programme which has been agreed by an Association of European Laboratories.

The research activities to be undertaken by STI under the Environment Programme regard industrial safety. This activity involves, to a large extent, disciplinary scientific competences and technical know-how in the field of fluid dynamics and multiphase flow which have been developed in the past years by the Institute in nuclear reactor safety investigations.

Industrial safety concentrates on processes in the chemical industry. Strong motives for research efforts in this area are:

- the necessity for industry to implement appropriate engineering safety measures and to update the latter in the light of technical progress;
- the need to improve continuously knowledge regarding anomalies and safety features of processes;
- the need to formulate guidelines for safety methodologies for industrial applications, especially in view of the completion of the internal market.

Phenomena investigated regard a sequence of failures and engineering safety measures in chemical processes: (a) off-normal chemical reactor operation leading to "runaway", (b) emergency pressure relief and fluid discharge from reactor vessels, (c) release of hazardous fluids with subsequent formation of a "dense vapour cloud" which may disperse in the environment and which may explode if the substances released are flammable.

STI will strengthen its expertise in the above area by operating experimental facilities ("FIRES" for chemical runaway reactions, MPMC for emergency venting on problems of industrial relevance) and by applying and validating computer programmes (dealing with runaway, venting, "dense" vapour cloud dispersion, explosion, and flame propagation).

The work will be done in close association and partnership with chemical industry and address the safety aspects of prevention, mitigation and consequence assessment. A strong link already exists with Shared Cost Action programme STEP, executed by the Commission.

In the ERCOFTAC consortium, the JRC has become a pilot centre for multiphase multicomponent flow. Here, the specialised informatics infrastructure and expertise of the Institute will be placed at the disposal of the participants of the consortium.

In Nuclear Fission Safety and Controlled Thermonuclear Fusion the Institute has to accommodate substantial reduction while keeping and developing scientific competence in those areas which are of renewed public concern. The Institute will concentrate on those projects where a coordinated effort on a European or international scale is necessary to make best use of resources and to reach common views in the scientifically most complex areas.

In the *Reactor Safety* programme the Institute will concentrate on the following main items which are all intended to be a focal point and substantial contribution to severe accident control and mitigation measures:

- the development and validation of computer codes for the estimation of the amount and quality of radioactive products which could potentially be released to the environment in the case of severe accidents in light water reactors (ESTER);
- the execution of large and small scale tests to study different aspects of aerosols and FP chemistry and physics and to provide a data base for code validation. Of particular importance in this context will be the continued participation of the Commission in the Phebus in pile fission product release testing programme and related activities which will be partially performed in-house;
- also for light water reactors, the study of complex phenomena like melt quenching in the coolant (in-vessel or ex-vessel) in the case of fuel melting and release on the vessel bottom or in the reactor cavity. In the FARO plant, tests with real reactor material in representative conditions will be performed. Later on, ex-vessel situations are also expected to be studied;
- new studies will be undertaken on the containment (loading and response) in the case of severe accidents in close cooperation with Member States' organizations.

In the *Safeguards Research Programme*, the STI contributes to research aiming at seeking at medium term and longer term basis new and improved methods for the Safeguards activities executed by the Commission inspectors (DG XVII) and

IAEA inspectors in the frame of the EURATOM Treaty and the Non-Proliferation Treaty. The research and collaboration with national research thus underpins the technical support provided by the JRC to DG XVII and to DG I (for IAEA).

The main scope of the programme is:

- Design and construction of integrated non destructive assay instruments;
- Development of techniques for NDA monitoring of Fissile Material;
- Setting up facilities for calibration and training.

The Safety Technology Institute has set up the calibration and training laboratory *PRE PERLA* that started operation in 1987 having an important inventory of well characterized reference materials. An average of 12 training courses for the facility are given each year to Euratom and IAEA inspectors as part of the last described scientific and technological support to the Commission.

In 1991, the new *PERLA* laboratory will be operational and will gradually substitute *PRE PERLA*.

A new generation of intelligent instruments specifically studied for customers will be developed to be delivered to the DG XVII Safeguards Directorate and IAEA.

New Fissile Material bulk standards will be characterized and acquired for the *PERLA* inventory.

The Institute's contribution to the ***Radioactive Waste Management*** programme has always pursued a double objective: to support available technologies for fuel reprocessing and waste disposal and to carry out research which may lead to diminution of waste and mitigate the acceptability problems of final waste disposal.

In particular the *PETRA* facility has been designed and constructed to undertake tasks on a significant scale which may be summarised as follows:

- extend the Purex process to handle fuel elements having a high-burn-up;
- provide an independent characterisation of vitrified waste;
- verify new partitioning processes for the separation of long lived radioisotopes;
- process non-standard spent fuel;
- test methods and procedures pertaining to fissile material accountancy.

Because of the multipurpose nature of the programme and the diverse interests of customers, *PETRA* will be operated with funding which is shared equally by the JRC programme, and interested organisations in Member States or third countries. It is foreseen at this stage to ensure a gradual operation of *PETRA* which should not be initiated before the availability of funds outside the programme is confirmed.

The JRC activities in ***Controlled Thermonuclear Fusion*** are largely oriented towards nuclear safety-relevant aspects of fusion machines aimed at preventing and eventually mitigating adverse effects from both routinely and accidentally originated release of radioactive materials, prevailing tritium, into the working and generic environment. In this context, STI will concentrate almost entirely on

the operation of *ETHEL*, the European Tritium Handling Experimental Laboratory. JRC and KfK cooperated in the design and construction of their tritium laboratories and together they will propose a detailed plan which takes into account the urgency of problems to be solved for JET and NET/ITER. *ETHEL* is more safety-oriented with particular emphasis given to investigating the migration modes of tritium in materials, components and equipments and to assessing transfer mechanisms with the ultimate aim of improving the protection of both the workers and the general public. *ETHEL* presents unique possibilities for studying loss mechanisms through containment barriers, investigating multiple containment systems and developing improved solid tritiated waste handling, treatment, conditioning and disposal techniques.

With the availability of two "climate chambers", the small and the large caisson of respectively 5 and 350 m<sup>3</sup> volume *ETHEL* is particularly suited for bench mark and scale-up tests of any kind of large gas volume treatment systems, thus closing the gap between laboratory-scale results and plant-scale design specifications.

In particular, the following topical areas will be addressed in separate series of experiments:

- Tritium interaction with first wall materials;
- Detritiation of large scale air or inert atmospheres in both normal and accidental conditions;
- Purification of plasma exhaust and tritium recovery from helium;
- Removal of impurities from hydrogen isotopes and subsequent hydrogen, deuterium, tritium separation;
- Development of improved tritiated waste management techniques.

The above activities will be mainly oriented by the NET/ITER needs. In addition, work has been identified in support to JET, the inclusion of which in the experimental activities of the *ETHEL* was judged most useful.

The most urgent problem for JET in connection with the preparation of the tritium phase is to demonstrate to the licensing authorities experimentally the tritium permeation rate through thin wall stainless steel bellows at elevated temperatures under dynamic operating conditions. It can be anticipated that many similar problems will arise for NET, where confidence of the licensing bodies will be obtainable only by practical demonstration. *ETHEL* is a candidate facility for such support work.

The Institute is called to give a minor contribution to the *Working Environment* programme. Laboratories presently working in this area are mostly involved in solving problems that require immediate solutions. The aim of STI is to find general calculation methods that can be used in the development of norms. The work will have the following thrusts:

- basic activities on *noise generation* and study of *transport of toxic and inflammable* products in a closed environment.

All the above are contributions to the Framework Programme and reinforce the objectives in the various chapters in which the JRC participates.

### **Human Capital and Mobility**

By its multidisciplinary nature, and because of the focal role of some of its important and unique installations, the Institute is particularly well prepared to contribute to this programme. The Institute offers training for young researchers and also draws upon the established networks with national laboratories and teams which could be further developed. This will include ERCOFTAC and the European Association of Structural Mechanics Laboratories.

### **SCIENTIFIC AND TECHNOLOGICAL SUPPORT FOR THE COMMISSION**

It is planned that the Institute will take a more vigorous part in the **Scientific and Technological Support for the Commission** task.

This will include continuing provision of safeguards tools as requested by the DG XVII Safeguards Directorate and the IAEA (Support to DG I). In the same frame, as mentioned above, there will be organised training courses for safeguards inspectors both from DG XVII and from IAEA using the unique facilities offered by the PERLA facility.

As already initiated, the STI will continue, but at an increased level, to respond to the request of DG XIII for testing and implementing new techniques and equipment developed in the ESPRIT programme. Furthermore, it will continue to honour the demand from DG XIII for exploitation of research results stemming from the activities of the Institute.

Assistance and transfer of know-how is expected to be provided for DG XI (Safety) and DG III (Norms and Standards) and the verification work on imported instruments for DG XXI.

### **CONTRACTUAL WORK FOR EXTERNAL THIRD PARTIES**

Concerning **Contractual Work for External Third Parties**, the Institute is planning a vigorous effort for selling the use of existing facilities to industry and national organizations and to put a wider range of multidisciplinary competences at the disposal of clients from public or private bodies.

Ongoing contract work and promising potentials are notably related to industrial hazards studies for chemical industries, behaviour of structures submitted to dynamic loading for building and construction industries, nuclear industries and petrochemical industries. Particular nuclear safety studies are ongoing for national authorities or the nuclear industry both related to reactor design and operation and to nuclear fuel cycle safety. Furthermore, it is intended to perform specific studies related to tritium technology for public authorities or industry.

## INSTITUTE FOR PROSPECTIVE TECHNOLOGICAL STUDIES

### I. OBJECTIVES

The basic task of the Institute is the acquisition, treatment and analysis of information concerning the state and trends of science and technology (S&T) and the execution of prospective studies in targeted areas of S&T.

The aim of the Institute's programme of work is to provide the Institute's customers with the background knowledge - data and reasoned arguments, scenarios, etc - necessary for informed decision making in matters concerning S&T. Thus, the Institute carries out strategic studies of technological developments for external customers (mainly other Services of the Commission, but also third party customers) and for the JRC (other Institutes, or at the request of the Director General's Office). The Institute acts as a consulting office, with no independent programme, operating in accordance with the customer-contractor principle and this clearly affects the structure of its activities.

In order to carry out its tasks the Institute has two main functions. The first of these is the observatory function in which the Institute endeavours to:

- collect information on trends in technological innovation;
- analyse, process and present the information in order to help determine research and technological development strategies;
- develop and use specialized databases of the information collected by the Institute, and
- describe the state of science and technology in selected areas of interest to the Community.

The second function is to execute prospective technological studies. This involves preparing S&T assessments, forecasts and scenarios as an aid to the formulation of research and development strategies, including analyses of economic, social and environmental impacts.

In pursuit of both functions, the Institute will make the best possible use of existing national bodies active in the same area, organizing European networks of S&T observatories and prospective studies units.

In this context, the Commission has received an offer from the Spanish Government to host the Institute at Seville within the Science Park which will be developed there following the EXPO 92. With assurance that the Institute would work in a scientific and technical environment, where a strong interaction occurs with research structures located at the same place and assurance that the implantation would not lead to any additional financial burden to the JRC, the Commission considers the proposal favourably.

The potential availability of work for third parties will be a strong determining factor in the decision concerning the location of the Institute.

## **II. 1992 - 1994 ACTIVITIES**

### **SPECIFIC PROGRAMMES**

Work for other JRC institutes will constitute the Institute's input to the Framework Programme (the main contribution being under ***Human Capital and Mobility*** which is described below). As an example of this work, it is expected that the studies on ***Advanced Materials*** will continue under this heading.

#### **Human Capital and Mobility**

The Institute will offer young research fellows the opportunity to receive specialized training in the field of technological prospective and assessment.

Basically, the programme will involve "training-through-research", whereby small teams, (e.g. 4 to 6 people each) are formed, including young scientists and at least one member of the Institute's staff.

Each team will be in charge of a project concerning technology assessment and study of technological prospects in a selected field, chosen from among the priority subjects for the Institute.

Collaboration and exchange of people with other institutes in the Member States will be organized and bi-annual seminars, with the participation of external experts, will allow the review and evaluation of the work done by each team.

In addition, the research fellows will be provided with training courses in Technological Forecasting and Assessment, language courses and introductory courses in European Affairs.

### **SCIENTIFIC AND TECHNOLOGICAL SUPPORT FOR THE COMMISSION**

The future priority envisaged for the Institute is the execution of projects under the "Support to the Commission" umbrella. This represents the central mission of the Institute and it will be covered by a series of multiannual contracts with several Commission Services (Forward Studies Unit (CdP), DG III, DG VII, DG XI, etc.). The work will consist of prospective studies in a restricted number of sectors and horizontal fields in which the Institute has, or is building up, expertise and reputation. These subjects will be reflected in the Institute's Annual Work Plans. They will be revised/modified as appropriate following the customer/contractor principle. The main fields of activity are expected to be the following:

- *Energy systems*: technological and market penetration potential of renewable energies; energy conservation; future options, such as fusion energy; problems related to CO<sub>2</sub> control and other environmental issues.
- *Transport systems*: air transport and aeronautical industries; high speed surface transportation; urban transport, etc.
- *Environment*: environmental impact of new technologies; technological options related to pollution avoidance; environmental technologies
- *Future technologies*: market penetration of selected advanced materials; materials in space applications; space markets; etc.

### **CONTRACTUAL WORK FOR EXTERNAL THIRD PARTIES**

To date, this has been largely restricted to central or regional public bodies in the Member States. The BMFT (German Federal Ministry for Research and Technology) Fusion contract is a good example. In the future it is hoped to introduce an industrial and private sector element.

### **ADDITIONAL ACTIVITIES**

Some "horizontal" or ad-hoc studies will be performed for and with DG XII and the JRC DG on issues such as:

- innovation process and industrial competitiveness;
- cross-impact of technologies (dual use and cross-sectoral fertilization);
- future strategies for the JRC and for some of its Institutes.

Baseline studies will be executed, with marginal resources, together with DG XII/Monitor and OECD, to improve the tools required by prospective activities (S&T indicators, interfacing national data bases, etc.).

Finally, the network activities should be consolidated in the 1992-1994 time frame. The Institute's antennae in North America and Japan should be fully operational and they, together with a network of national experts in the Member States, will make significant contributions to the studies of the Institute.



# **FINANCIAL STATEMENTS**

## **FICHE FINANCIERE N° 1:**

### **Activités de recherche: 3ème programme cadre**

**1. Intitulé de l'action:**

Voir ci-dessus.

**2. Lignes budgétaires concernées:**

B6.11      personnel (en partie);  
B6.121     infrastructures administratives et techniques (en partie);  
B6.122     supports scientifiques et techniques (en partie);  
B6.3       crédits opérationnels directs.

**3. Base légale:**

Proposition de programme du CCR 1992-1994 (3ème programme cadre 1990-94).

**4. Description de l'action:**

4.1. Objectif spécifique de l'action: activités de recherche, action directe, menées par le CCR dans les domaines suivants:

Technologies industrielles et des matériaux: Matériaux,  
Environnement du travail;  
Mesures et essais;  
Environnement;  
Sûreté de la fission;  
Fusion;  
Capital humain et mobilité.

Il est prévu d'autre part de consacrer une partie des crédits et moyens, à concurrence de 6 % des montants initialement prévus, à des activités de recherche exploratoire dans des domaines prometteurs.

4.2. Durée:

Exercice 1992-94.

4.3. Population visée par l'action:

Communauté scientifique internationale.

**5. Classification de la dépense ou des recettes**

5.1. DNO (Dépenses non obligatoires).

5.2. CD (Crédits dissociés).

5.3. Types de recettes visées: ressources propres de la Communauté.

## 6. La nature de la dépense:

Couverture des différents moyens mis en oeuvre pour l'exécution des programmes de recherches tels que repris au point 2.

## 7. Incidence financière:

### 7.1. Mode de calcul du coût total de l'action:

- prévision des dépenses de personnel sur base de l'évolution économique à moyen terme dans les divers pays de la Communauté hôtes des centres de recherche du CCR;
- prévision des frais généraux et des supports scientifiques et techniques, dans les mêmes conditions;
- évaluation des crédits spécifiques nécessaires à l'exécution des programmes de recherches (dépenses directes pour fonctionnement, équipements et contrats).

Le tableau ci-après met en évidence la nature des dépenses par programme spécifique.

Programme CCR 1992-94  
Moyens de réalisation

| Activité                      | Personnel   | Infrastructure<br>admin./tech. | Support<br>Scient./techn. | Total       | Crédits<br>opérationnels | TOTAL       |
|-------------------------------|-------------|--------------------------------|---------------------------|-------------|--------------------------|-------------|
| Matériaux                     | 49 306.812  | 8.027.726                      | 1.639.471                 | 9.667.197   | 6.366.000                | 65.340.009  |
| Environnement<br>du travail   | 8.073 477   | 1.322.509                      | 207.524                   | 1.530.033   | 2.277.000                | 11.880.510  |
| Mesures et essais             | 53.688.813  | 10.012.396                     | 11.561.275                | 21.573.671  | 13.837.000               | 89.099.484  |
| Environnement                 | 99.207.976  | 16.513.872                     | 3.832.520                 | 20.346.392  | 28.945.000               | 148.499.368 |
| Fission                       | 97.480.344  | 18.436.924                     | 23.813.932                | 42.250.856  | 24.609.000               | 164.340.200 |
| Fusion                        | 25.996.697  | 4.591.464                      | 5.205.721                 | 9.797.185   | 4.796.000                | 40.589.882  |
| Capital humain<br>et mobilité | 3.087.557   | 4.508.344                      | 29.726                    | 4.538.070   | 17.124.000               | 24.749.627  |
| Total Prog.-cadre             | 336.841.676 | 63.413.235                     | 46.290.169                | 109.703.404 | 97.954.000               | 544.499.080 |

Il est à noter que la Commission prévoit un développement des activités de l'Institut des Matériaux de Petten s'accompagnant d'un accroissement des effectifs de cet Institut. A cette fin un nouveau bâtiment à usage de bureaux et laboratoires sera construit sur le site de Petten; cette construction fera l'objet d'un contrat de leasing immobilier avec l'ECN de Petten.

La signature en est prévue à la fin de l'exercice 1991 avec un premier versement de 320.000 écus. Le solde payable en 5 annualités de 300.000 écus permettra au CCR de devenir propriétaire de cette construction à l'issue de cette période. Le coût global de l'opération y compris travaux annexes et aménagements intérieurs est estimé à 1.900.000 écus.

## **FICHE FINANCIERE N° 2:**

### **Activités de Support scientifique et technique à la Commission**

**1. Intitulé de l'action:**

Activités de Support à la Commission

**2. Lignes budgétaires concernées:**

B6.11      personnel (en partie);  
B6.121     infrastructures administratives et techniques (en partie);  
B6.122     supports scientifiques et techniques (en partie);  
B6.421     crédits opérationnels directs.

**3. Base légale:**

Article 8 du Traité instituant la Communauté Européenne de l'Energie Atomique (EURATOM);

Proposition de programme du CCR 1992-1994.

**4. Description de l'action:**

**4.1. Objectif spécifique de l'action:**

Apporter aux politiques sectorielle de la Commission, chaque fois que de besoin, l'expertise ou le support scientifique et technique du CCR dans les domaines de sa compétence.

**4.2. Durée:**

La plupart de ces actions s'étendent sur plusieurs exercices et font l'objet d'accords pluriannuels avec les Directions générales concernées. Certaines d'entre elles ont toutefois un caractère ponctuel et ne font pas l'objet d'un accord pluriannuel.

**4.3. Population visée par l'action:**

l'ensemble de la population concernée par les politiques sectorielles communautaires faisant appel à des technique relevant du domaine de la Recherche et du Développement.

**5. Classification de la dépense:**

5.1. DNO (Dépenses non obligatoires).

5.2. CD (Credits dissociés).

5.3. Types de recettes visées: ressources propres de la Communauté.

**6. Type de la dépense:**

Couverture des différents moyens mis en oeuvre pour l'exécution des activités de support scientifique et technique tels que repris au point 2.

**7. Incidence financière:****7.1. Mode de calcul du coût total de l'action:**

- prévision des dépenses de personnel sur base de l'évolution économique à moyen terme dans les divers pays de la Communauté hôtes des centres de recherche du CCR;
- prévision des frais généraux et des supports scientifiques et techniques, dans les mêmes conditions;
- évaluation des crédits spécifiques nécessaires à l'exécution des programmes de recherches (dépenses directes pour fonctionnement, équipements et contrats).

Le tableau ci-après met en évidence la nature des dépenses par programme spécifique.

**Programme CCR 1992-94**  
**Moyens de réalisation**

| Activité              | Personnel   | Infrastructure<br>admin./tech. | Support<br>Scient./techn. | Total      | Crédits<br>opérationnels | TOTAL       |
|-----------------------|-------------|--------------------------------|---------------------------|------------|--------------------------|-------------|
| Support<br>Commission | 108.278.832 | 18.285.928                     | 8.084.742                 | 26.370.670 | 55.351.000               | 190.000.502 |

**7.2. Part du "mini-budget" dans le coût total de l'action:**

La part du mini-budget représente environ 6 % du coût total de l'action.

**7.3. Programmation indicative:**

Le tableau ci-après met en évidence l'effort que le CCR prévoit d'effectuer dans ce domaine au cours des exercices 1992-1994.

**8. Dispositions anti-fraude prévues dans la proposition d'action:**

Système de contrôle interne du CCR lui-même et du contrôleur financier dans les quatre centres du CCR.

**9. Eléments d'analyse coût-efficacité:****9.1. Appréciation et analyse des objectifs:**

Les activités de support à la Commission sont destinées à appuyer la mise en oeuvre -et/ou la formation) des politiques communautaires.

Il est à noter également l'intention de la Commission de procéder à la réhabilitation d'un ensemble de logements sociaux dont dispose le CCR Ispra (Village Brebbia) pour augmenter les capacités d'accueil des jeunes arrivés, notamment boursiers, stagiaires, visiteurs scientifiques; cette politique se situe en particulier dans le cadre de la politique d'ouverture du CCR, menées depuis le début 1988 aux jeunes scientifiques de tous les horizons.

Le coût de cette réhabilitation est estimée à 1.600.000 écus pour les travaux de restructuration proprement dit (exercice 1993) et environ 350.000 écus pour les aménagements internes (exercice 1993).

7.2. Part du "mini-budget" dans le coût total du programme environ 1 %.

7.3. Programmation indicative.

**8. Dispositions anti-fraude prévues dans la proposition d'action:**

Système de contrôle interne du CCR lui-même et du contrôleur financier dans les quatre centres du CCR.

**9. Eléments d'analyse coût-efficacité:**

9.1. Appréciation et analyse des objectifs:

Les programmes spécifiques de R & D répondent aux objectifs définis dans le programme-cadre 1990-1994 en tenant compte du principe de subsidiarité.

Les objectifs spécifiques du CCR pour son programme 1992-1994 seront fixés dans les annexes aux décisions du Conseil. Comme prévu dans l'article 2 du Règlement financier, chacun de ces objectifs spécifiques fera l'objet, tout en tenant compte de la nature de la recherche, d'une quantification par le CCR, en termes opérationnels. Cette quantification devrait permettre l'établissement d'indicateurs de performance qui seront utilisés dans le cadre de l'évaluation future des résultats acquis par rapport aux objectifs.

9.2. Justification de l'action:

Participation du CCR dans une partie des actions (actions nucléaires et non nucléaires) dont le montant global et les thèmes ont été définis par décision du Conseil (décision 90/224/EURATOM CEE du Conseil du 13.04.90 J.O. L 117/90).

9.3. Evaluation:

C'est dans le cadre de l'exécution proprement dite des activités du CCR (objectif de recherche, support à la Commission, activités pour le compte de tiers) que l'efficacité des moyens mis en oeuvre, dont le personnel représente la composante la plus importante, est analysée selon les critères suivants:

- l'application du principe contractant-client pour les activités de R&D du CCR garantit leur utilisation - 1 % du montant réservé au sein du programme cadre sera utilisé pour la diffusion et l'utilisation des résultats dans le cadre du programme VALUE;

- l'ensemble des activités du CCR font l'objet de "work schedules" annuels soumis à l'approbation du Conseil d'Administration du CCR. Ils indiquent les étapes des différents projets de R&D;
- le système informatisé MACS de comptabilité de gestion, récemment mis en service, doit permettre un contrôle plus précis des coûts. Par ailleurs, la mise en place d'une unité d'efficacité de gestion (Management Efficiency Unit) doit assurer la revue permanente des procédés de gestion pour assurer, entre autres, la diminution des frais généraux.
- De manière à juger de leur efficacité, les activités du CCR feront l'objet d'un suivi et d'une évaluation afin d'examiner dans quelle mesure chacun des objectifs spécifiques fixés par le Conseil aura été atteint tout en tenant compte des indicateurs de performance préétablis et du rapport coût-efficacité.

## **FICHE FINANCIERE N° 2:**

### **Activités de Support scientifique et technique à la Commission**

**1. Intitulé de l'action:**

Activités de Support à la Commission

**2. Lignes budgétaires concernées:**

B6.11 personnel (en partie);  
B6.121 infrastructures administratives et techniques (en partie);  
B6.122 supports scientifiques et techniques (en partie);  
B6.421 crédits opérationnels directs.

**3. Base légale:**

Article 8 du Traité instituant la Communauté Européenne de l'Energie Atomique (EURATOM);

Proposition de programme du CCR 1992-1994.

**4. Description de l'action:**

**4.1. Objectif spécifique de l'action:**

Apporter aux politiques sectorielle de la Commission, chaque fois que de besoin, l'expertise ou le support scientifique et technique du CCR dans les domaines de sa compétence.

**4.2. Durée:**

La plupart de ces actions s'étendent sur plusieurs exercices et font l'objet d'accords pluriannuels avec les Directions générales concernées. Certaines d'entre elles ont toutefois un caractère ponctuel et ne font pas l'objet d'un accord pluriannuel.

**4.3. Population visée par l'action:**

l'ensemble de la population concernée par les politiques sectorielles communautaires faisant appel à des technique relevant du domaine de la Recherche et du Développement.

**5. Classification de la dépense:**

5.1. DNO (Dépenses non obligatoires).

5.2. CD (Credits dissociés).

5.3. Types de recettes visées: ressources propres de la Communauté.



**6. Type de la dépense:**

Couverture des différents moyens mis en oeuvre pour l'exécution des activités de support scientifique et technique tels que repris au point 2.

**7. Incidence financière:****7.1. Mode de calcul du coût total de l'action:**

- prévision des dépenses de personnel sur base de l'évolution économique à moyen terme dans les divers pays de la Communauté hôtes des centres de recherche du CCR;
- prévision des frais généraux et des supports scientifiques et techniques, dans les mêmes conditions;
- évaluation des crédits spécifiques nécessaires à l'exécution des programmes de recherches (dépenses directes pour fonctionnement, équipements et contrats).

Le tableau ci-après met en évidence la nature des dépenses par programme spécifique.

**Programme CCR 1992-94**  
**Moyens de réalisation**

| Activité              | Personnel   | Infrastructure<br>admin./tech. | Support<br>Scient./techn. | Total      | Crédits<br>opérationnels | TOTAL       |
|-----------------------|-------------|--------------------------------|---------------------------|------------|--------------------------|-------------|
| Support<br>Commission | 108.278.832 | 18.285.928                     | 8.084.742                 | 26.370.670 | 55.351.000               | 190.000.502 |

**7.2. Part du "mini-budget" dans le coût total de l'action:**

La part du mini-budget représente environ 6 % du coût total de l'action.

**7.3. Programmation indicative:**

Le tableau ci-après met en évidence l'effort que le CCR prévoit d'effectuer dans ce domaine au cours des exercices 1992-1994.

**8. Dispositions anti-fraude prévues dans la proposition d'action:**

Système de contrôle interne du CCR lui-même et du contrôleur financier dans les quatre centres du CCR.

**9. Eléments d'analyse coût-efficacité:****9.1. Appréciation et analyse des objectifs:**

Les activités de support à la Commission sont destinées à appuyer la mise en oeuvre -et/ou la formation) des politiques communautaires.

**9.2. Justification de l'action:**

L'application du principe contractant-client pour les activités de R & D garantit leur utilisation.

**9.3. Evaluation:**

- ces activités sont analysées et contrôlées comme toute les autres activités du CCR;
- l'ensemble des activités du CCR font l'objet de "work schedules" annuels soumis à l'approbation du Conseil d'Administration du CCR. Ils indiquent les étapes des différents projets de R&D;
- le système informatisé MACS de comptabilité de gestion, récemment mis en service, doit permettre un contrôle plus précis des coûts. Par ailleurs, la mise en place d'une unité d'efficacité de gestion (Management Efficiency Unit) doit assurer la revue permanente des procédés de gestion pour assurer, entre autres, la diminution des frais généraux;
- de plus, les objectifs à atteindre, les moyens nécessaires et les résultats obtenus font l'objet d'examens périodiques entre les responsables de la Direction générale du CCR et les autres Directions générales concernées.

### **FICHE FINANCIERE N° 3:**

#### **Prestations de services pour le compte de tiers**

**1. Intitulé de l'action:**

Voir ci-dessus.

**2. Lignes budgétaires concernées:**

B6.11      personnel (en partie);  
B6.121     infrastructures administratives et techniques (en partie);  
B6.122     supports scientifiques et techniques (en partie);  
B6.431.

Cette dernière ligne est destinée à accueillir les crédits nécessaires aux dépenses spécifiques des divers travaux exécutés pour le compte de tiers qui font, cas par cas, l'objet d'une évaluation avec les tiers concernés.

Conformément aux dispositions de l'article 96 paragraphe 1 du règlement financier, cette ligne fera l'objet, en cours d'exercice, de l'ouverture de crédits supplémentaires pour les dépenses spécifiques propres à chaque contrat avec un tiers, à concurrence des recettes à inscrire au poste correspondant du budget général.

**3. Base légale:**

Règlement Financier, Article 96:

Résolution du Conseil du 29 juin 1988, concernant les activités devant être exécutées par le Centre Commun de recherche (CCR) (J.P. n° C 197 du 27.7.1988, p. 4);

Décision 89/340/CEE du Conseil, du 3 mai 1988, concernant les travaux en rapport avec la Communauté économique européenne, réalisés pour des tiers par le Centre commun de recherche (JO n° L 142 du 25.5.1989, p. 10);

Proposition de programme du CCR 1992-1994.

**4. Description de l'action:**

**4.1 Objectifs spécifiques de l'action:**

Exécuter sur demande et contre rémunération des travaux pour le compte de tiers.

**4.2. Durée:**

Actions ponctuelles renouvelables ayant souvent un caractère pluriannuel.

**4.3. Population visée par l'action:**

Organismes de recherche, industries et PME (Petites et Moyennes Entreprises).

**5. Classification de la dépense ou des recettes:**

5.1. DNO (Dépenses non obligatoires).

5.2. CD (Crédits dissociés).

5.3. Types de recettes visées:

Ressources propres de la Communauté donnant lieu à remboursement et recettes tiers.

**6. La nature des recettes:**

Types de la dépense et de la recette:

Les travaux donnent par principe lieu à recettes dans le cadre de contrats signés avec des tiers.

Toutefois pour garantir la couverture légale du personnel relevant du Tableau des effectifs et assurer le fonctionnement des Instituts et des services responsables du site d'Ispra une avance sous forme de crédits budgétaires, articles B6-111, B6-121 et B6-122 correspondant aux moyens (frais généraux correspondant au personnel de recherche envisagé et utilisation des Supports scientifiques et techniques) que le CCR prévoit de mettre à disposition de ce type d'activité est demandée à l'Autorité Budgétaire. Dans ces conditions une recette correspondante est constituée par les ressources propres de la Communauté, mais elle devrait être couverte par des contrats tiers d'un montant équivalent.

Les recettes provenant de contrats tiers au-delà de ce remboursement permettent la création de crédits supplémentaires à l'article B6.431 afin de couvrir des dépenses spécifiques nécessaires pour l'exécution des contrats (article 96 du R.F.).

**7. Incidence financière:**

7.1. Mode de calcul du coût total de l'action:

Compte tenu de l'expérience du passé et du personnel que le CCR prévoit de mettre à disposition de ces activités le mode de calcul est celui des autres activités du CCR.

- prévisions des dépenses de personnel sur base de l'évolution économique à moyen terme dans les divers pays de la Communauté hôtes des centres de recherche du CCR;
- prévision des frais généraux et des supports scientifiques et techniques, dans les mêmes conditions;
- évolution des crédits spécifiques nécessaires à l'exécution de ces activités pour le compte de tiers. Sur base de l'expérience acquise lors du programme 1988-1991 ces crédits spécifiques sont évalués à 40 % du coût total des contrats tiers.

7.2. Part du "mini-budget" dans le coût total de l'action:

Sans objet.

## 7.3. Programmation indicative:

En principe sans objet, s'agissant d'actions ponctuelles.

Le tableau ci-après met toutefois en évidence l'effet que le CCR prévoit d'effectuer dans ce domaine au cours des exercices 1992 à 1994.

Programme CCR 1992-94  
Moyens de réalisation

| Activité          | Personnel  | Infrastructure<br>admin./tech. | Support<br>Scient./techn. | Total     | Crédits<br>opérationnels | TOTAL      |
|-------------------|------------|--------------------------------|---------------------------|-----------|--------------------------|------------|
| Prestations tiers | 34.068.064 | 5.837.027                      | 3.728.573                 | 9.565.600 | 24.367.000               | 68.000.664 |

## 7.4. Gestion des recettes:

Les recettes provenant des prestations pour tiers donnent lieu à remboursement des lignes budgétaires concernées (voir point 2) à concurrence des recettes encaissées.

A cette fin les recettes provenant des prestations pour tiers sont ventilées entre:

- les recettes donnant lieu à l'ouverture de crédits supplémentaires;
- les recettes donnant lieu à remboursement au budget général. Ces dernières correspondent aux remboursements dus au titre des avances effectuées par le budget général.

Elles concernent:

- les dépenses de personnel;
- les frais généraux;
- les éventuels supports scientifiques et techniques.

Les montants donnant lieu à remboursement sont déterminés lors de l'établissement de chaque contrat de prestations pour tiers, conformément aux règles internes.

Lors de leur encaissement, les recettes sont imputées à l'état des recettes sur les lignes budgétaires ouvertes à cet effet.

## 8. Dispositions anti-fraude prévues dans la proposition d'action:

Système de contrôle interne du CCR lui-même et du contrôleur financier dans les quatre centres du CCR.

## 9. Eléments d'analyse coût-efficacité:

## 9.1. Appréciation et analyse des objectifs:

Les activités pour comptes de tiers sont destinées pour l'essentiel à renforcer la compétitivité industrielle de la Communauté.

9.2. Justification de l'action:

L'application du principe contractant-client pour les activités de R & D du CCR garantit leur utilisation.

9.3. Evaluation:

- le nombre et le volume des contrats signés dans ce cadre est un indice d'évaluation du coût /efficacité;
- le système informatisé MACS de comptabilité de gestion, récemment mis en service, doit permettre un contrôle plus précis des coûts. Par ailleurs, la mise en place d'une unité d'efficacité de gestion (Management Efficiency Unit) doit assurer la revue permanente des procédés de gestion pour assurer, entre autres, la diminution des frais généraux.

work for third parties (excluding HFR)  
Estimated outcome 1988-1991 (MECU)

|                                                                                                                                               | Actual<br>1988-90 | Estimate<br>1991 | Total<br>(estimate)<br>1988-91 | Objective<br>for 1992<br>-1994 |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|--------------------------------|--------------------------------|
| VALUE OF CONTRACTS SIGNED<br>WITH THIRD PARTIES                                                                                               | 23,5              | 16,0             | 40,0                           | 68                             |
| - Receipts from 3rd parties<br>used to "reimburse" appro-<br>priations granted for per-<br>sonnel, infrastructure and<br>overhead expenditure | 3,8               | 19,0*            | 23,0*                          | 41-44                          |
| - Receipts forecast for 1991<br>and following years in order<br>to "reimburse" the appro-<br>priations granted for the<br>"fonds d'avance"    | -                 | 3,3*             | 3,3*                           | -                              |
| - Receipts used to created<br>supplementary appropriations<br>for specific expenditure on<br>individual contracts with<br>third parties       | 7,6               | 6,0*             | 14,0*                          | 27-24                          |
| TOTAL RECEIPTS                                                                                                                                | 11,4              | ~28,0            | 40,0                           | 68                             |
| - Appropriations granted<br>for personnel, infrastructure<br>and overhead expenditure<br>which were not used and<br>therefore cancelled       | 10,8              | 9-12             | 19-22                          | p.m.                           |
| <u>TARGET WORK FOR THIRD PARTIES</u>                                                                                                          |                   |                  | 59-62                          | 68                             |

including receipts in future years (1992, etc) resulting from contracts  
signed during the period 1988-91.

## **FICHE FINANCIERE N° 4:**

### **Exploitation du réacteur HFR**

**1. Intitulé de l'action:**

Voir ci-dessus.

**2. Lignes budgétaires concernées:**

86.11      personnel (en partie);  
6220      recettes provenant de l'exploitation du HFR et destinées au  
            remboursement de crédits inscrits à l'état des dépenses;  
6221      recettes provenant de l'exploitation du HFR et donnant lieu à  
            l'ouverture de crédits supplémentaires.

**3. Base légale:**

Proposition de programme du CCR 1992-1994, Programme complémentaire  
(le Royaume des Pays Bas et la République Fédérale d'Allemagne)  
1992-1995.

**4. Description de l'action:**

4.1. Exploitation du réacteur à haut flux (HFR) de l'Institut des Matériaux  
de Petten pour les besoins des 2 gouvernements concernés.

4.2. Durée:

Exercices 1992-94. (Le programme complémentaire est pour la  
période 1992-1995 bien que la programmation financière porte  
seulement sur les trois premières années).

4.3. Population visée par l'action:

Les gouvernements du Royaume des Pays Bas et de la République  
Fédérale d'Allemagne.

**5. Classification de la dépense ou des recettes:**

5.1. DNO (Dépenses non obligatoires).

5.2. CD (Crédits dissociés).

5.3. Types de recettes visées:

- ressources propres de la Communauté;
- recettes tiers.

**6. La nature de la dépense:**

Couverture des différents moyens mis en oeuvre pour l'exploitation du  
HFR.



**7. Incidence financière:****7.1. Mode de calcul du coût total de l'action:**

- prévision des dépenses de personnel sur base de l'évolution économique à moyen terme dans les divers pays de la Communauté hôtes des centres de recherche du CCR;
- prévision des frais généraux et des supports scientifiques et techniques, dans les mêmes conditions;
- évolution des crédits spécifiques nécessaires à l'exécution des programmes de recherches (dépenses directes pour fonctionnement, équipements et contrats).

Le tableau ci-après met en évidence la nature des dépenses envisagées pour cette activité.

**Programme CCR 1992-94**  
**Moyens de réalisation**

| Activité               | Personnel  | Infrastructure<br>admin./tech. | Support<br>Scient./techn. | Total      | Crédits<br>opérationnels | TOTAL      |
|------------------------|------------|--------------------------------|---------------------------|------------|--------------------------|------------|
| Exploitation<br>du HFR | 20.591.428 | 3.574.891                      | 34.780.435                | 38.355.326 | 10.053.000               | 68.999.754 |

Il est à noter que le calcul de l'incidence financière a été mené en tenant compte d'une contribution en nature fournie par le Gouvernement néerlandais évaluée à 7,5 Mio écus en 3 ans.

Compte tenu de cette contribution en nature la participation financière de chacun des 2 gouvernements concernés est de 50 %.

Les dépenses de personnel donnent lieu à remboursement du budget général.

**7.2. Part du "mini-budget" dans le coût total du programme:**

Sans objet.

**7.3. Programmation indicative.****8. Dispositions anti-fraude prévues dans la proposition d'action:**

Système de contrôle interne du CCR lui-même et du contrôleur financier dans les quatre centres du CCR.

**9. Eléments d'analyse coût-efficacité:**

- Eléments d'analyse coût efficacité de la responsabilité du Comité inter-gouvernemental de Gestion du HFR.

**PROGRAMME C.C.R. 1992-94**

| ACTIVITE              | Personnel   | MOYENS DE REALISATION           |                           |             | crédits<br>opérationnels | TOTAL       |
|-----------------------|-------------|---------------------------------|---------------------------|-------------|--------------------------|-------------|
|                       |             | Infrastructure<br>admin./techn. | Support<br>scient./techn. | Total       |                          |             |
| MATERIAUX             | 49.306.812  | 8.027.726                       | 1.639.471                 | 9.667.197   | 6.366.000                | 65.340.009  |
| ENVIRONNEMENT TRAVAIL | 8.073.477   | 1.322.509                       | 207.524                   | 1.530.033   | 2.277.000                | 11.880.510  |
| MESURES & ESSAIS      | 53.688.813  | 10.012.396                      | 11.561.275                | 21.573.671  | 13.837.000               | 89.099.484  |
| ENVIRONNEMENT         | 99.207.976  | 16.513.872                      | 3.832.520                 | 20.346.392  | 28.945.000               | 148.499.368 |
| FISSION               | 97.480.344  | 18.436.924                      | 23.813.932                | 42.250.856  | 24.609.000               | 164.340.200 |
| FUSION                | 25.996.697  | 4.591.464                       | 5.205.721                 | 9.797.185   | 4.796.000                | 40.589.882  |
| CAPITAL HUMAIN        | 3.087.557   | 4.508.344                       | 29.726                    | 4.538.070   | 17.124.000               | 24.749.627  |
| Total Prog. Cadre     | 336.841.676 | 63.413.235                      | 46.290.169                | 109.703.404 | 97.954.000               | 544.499.080 |
| SUPPORT COMMISSION    | 108.278.832 | 18.285.928                      | 8.084.742                 | 26.370.570  | 55.351.000               | 190.000.502 |
| PRESTATIONS TIERS     | 34.068.064  | 5.837.027                       | 3.728.573                 | 9.565.600   | 24.367.000               | 68.000.664  |
| Total CCR en Budget   | 479.188.572 | 87.536.190                      | 58.103.484                | 145.639.674 | 177.672.000              | 802.500.246 |
| EXPLOITATION DU HFR   | 20.591.428  | 3.574.891                       | 34.780.435                | 38.355.326  | 10.053.000               | 68.999.754  |
| Total général CCR     | 499.780.000 | 91.111.081                      | 92.883.919                | 183.995.000 | 187.725.000              | 371.500.000 |

**PROGRAMME DU CENTRE COMMUN DE RECHERCHE 1992-1994.  
Echéancier pluriannuel des engagements**

| Chapitre<br>Article<br>Poste | Intitulé<br><br>Activités                                             | Crédits d'engagement |                |                |                |
|------------------------------|-----------------------------------------------------------------------|----------------------|----------------|----------------|----------------|
|                              |                                                                       | Programme 1992-1994  |                |                |                |
|                              |                                                                       | 1992                 | 1993           | 1994           | Total          |
| 86-3                         | CENTRE COMMUN DE RECHERCHE:<br>PROGRAMME CADRE 1992-1994              |                      |                |                |                |
| 86-31                        | TECHNOLOGIES DIFFUSANTES                                              |                      |                |                |                |
| 86-312                       | Technologies industrielles et des matériaux                           |                      |                |                |                |
| 86-3121                      | Technologies industrielles et des matériaux                           | 25.081               | 25.583         | 26.557         | 77.221         |
| 86-3122                      | Mesures et essais                                                     | 27.798               | 29.743         | 31.561         | 89.100         |
|                              | Total de l'article 86-312                                             | 52.877               | 55.326         | 58.118         | 156.321        |
| 86-32                        | GESTION DES RESSOURCES NATURELLES                                     |                      |                |                |                |
| 86-321                       | Environnement                                                         |                      |                |                |                |
| 86-3211                      | Environnement                                                         | 48.049               | 48.738         | 51.718         | 148.499        |
| 86-323                       | Energie                                                               |                      |                |                |                |
| 86-3232                      | Sûreté de la fission nucléaire                                        | 56.480               | 52.787         | 55.073         | 164.340        |
| 86-3233                      | Fusion thermonucléaire contrôlée                                      | 12.874               | 13.511         | 14.208         | 40.590         |
|                              | Total de l'article 86-323                                             | 117.403              | 115.033        | 120.993        | 353.429        |
| 86-33                        | VALORISATION DES RESSOURCES INTELLECTUELLES                           |                      |                |                |                |
| 86-331                       | Capital humain et mobilité                                            | 7.920                | 8.217          | 8.813          | 24.750         |
| 36-35                        | RECHERCHE EXPLORATOIRE                                                |                      |                |                |                |
| 36-351                       | Recherche exploratoire                                                | pm                   | pm             | pm             | pm             |
|                              | <b>TOTAL DU PROGRAMME CADRE DU C.C.R.</b>                             | <b>178.200</b>       | <b>178.576</b> | <b>187.724</b> | <b>544.500</b> |
|                              | CENTRE COMMUN DE RECHERCHE:<br>ACTIONS D'ACCOMPAGNEMENT ET DE SUPPORT |                      |                |                |                |
| 86-42                        | SUPPORT S/T AUX AUTRES DIRECTIONS GENERALES                           | 55.817               | 66.606         | 67.577         | 190.000        |
| 86-43                        | PRESTATIONS POUR LE COMPTE DE TIERS                                   | 21.437               | 22.747         | 23.818         | 68.000         |
| 86-44                        | EXPLOITATION DU REACTEUR A HAUT FLUX                                  | 20.884               | 22.977         | 25.139         | 69.000         |
|                              | <b>TOTAL ACTIONS D'ACCOMPAGNEMENT ET DE SUPPORT</b>                   | <b>98.138</b>        | <b>112.330</b> | <b>116.532</b> | <b>327.000</b> |
|                              | <b>TOTAL GENERAL CENTRE COMMUN DE RECHERCHE</b>                       | <b>276.338</b>       | <b>290.906</b> | <b>304.256</b> | <b>871.500</b> |

**STATEMENT OF IMPACT  
ON COMPETITIVENESS  
AND EMPLOYMENT**

**1. The main reason for introducing the measure**

The proposed EEC and EAEC specific programmes constitute a contribution to the implementation of the Third Framework Programme for Community Research and Technological Development (1990-1992) in those fields, where the JRC can offer an impartial and independent expert opinion for the benefit of all Community policies. This applies notably to prenormative research in the fields of materials, working environment, reference measurements and methods in non-nuclear and nuclear areas, to environmental research and to research on nuclear and industrial safety. Finally, the human capital and mobility scheme will provide training for around 200 young researchers annually in the JRC, collaborating with national laboratories.

**2. Features of the business in question**

The programmes by their very nature are deemed to be of interest to a wide range of businesses, including small and medium sized ones. In relevant areas of mutual interest, active collaboration for achieving the programme objectives will be sought with industry throughout the Community.

**3. Obligations imposed on business**

In general, no direct obligations are foreseen following the implementation of the proposed Council Decisions. Industries possibly entering into collaboration agreements with the JRC related to the execution of part of the programmes will satisfy obligations under such agreements.

**4. Indirect obligations likely to be imposed on business by national, regional or local authorities**

None are envisaged.

**5. Special provisions in respect of SME's**

The JRC will - as in the past - endeavour, through the appropriate channels and schemes, to make the results of its research under the programmes available to small and medium-sized enterprises. Such enterprises are users of the JRC research installations and execute projects for the exploitation of JRC research.

Finally, the JRC for the general operation of its geographical sites in many areas, draws upon the services provided by small and medium-sized firms.

**6. Likely effects on:**

**a) The competitiveness of business**

The research envisaged under the proposed programmes possesses chiefly a prenormative dimension, and its outcome should lead to the setting up of further norms, standards and codes of practice in several areas of industry, business and societal affairs, including the protection of the human and natural environments. The overall effect is a contribution to the further fostering of the large internal market of

the Community and thereby an addition to the measures for the increase of the competitiveness of industry and other businesses. The prenormative research, both long and short-term, will *inter alia* lead to new technological developments of industrial interest and to the provision of new instrumentation for correctly gauging compliance to norms, standards and regulations set by European or international standardization bodies, as well as national or Community regulatory authorities. The development and access of industry to such instrumentation (ranging from large scale test and experimental facilities to reference materials for numerous purposes) will contribute to quality, reliability and safety of products and processes, and thus to the competitiveness of business and industry.

**b) Employment**

In addition to the jobs provided by the JRC on its four geographical sites housing the scientific Institutes, the housing of 2000 staff and their families, young researchers under training, scientific visitors and seconded national experts, the staff of the European schools and local services, have an important social aspect extending well beyond the research activities and their supporting services. The highly diversified demands for services and consumer goods from the entire JRC-related population has led, in fact, and continues to lead to the creation and maintaining of jobs, both in the local communities around the JRC sites and more widely throughout Europe. The increasing efforts of associating JRC research with similar national research has likewise on national grounds, led to the creation of new jobs specifically concerned with the collaboration with the JRC. This trend may accelerate with the proposals for the JRC programmes for 1992-1994.

In a broader context, there are examples of the results obtained at the JRC leading to new initiatives either in existing firms or in the creation of new firms: this obviously tends to create new jobs. This trend will continue, with the Centre more and more closely oriented to the needs of European industry and operating in collaboration with it.

**7. Consultation of representative organisations**

The proposed EEC and EAEC programmes will be submitted to the Economic and Social Committee for opinion and the EAEC programmes likewise to the Scientific and Technical Committee. During preparation of the programmes, close contact has been maintained, notably for the prenormative dimension, with the Industrial Research and Development Advisory Committee.

The programme proposals are elaborated in a long-lasting dialogue with the JRC Board of Governors and discussed or to be discussed with the relevant committees for the Shared Cost Action programmes belonging to the same lines of the Framework Programme as the JRC programmes.

Finally, the programmes which will be executed by the JRC scientific institutes are included in the standing consultations with the Institute Advisory Boards for the JRC Institutes, as well as the JRC Scientific Committee.

ISSN 0254-1475

COM(91) 281 final

# DOCUMENTS

EN

15

---

Catalogue number : CB-CO-91-333-EN-C

ISBN 92-77-74732-3

---

Office for Official Publications of the European Communities  
L-2985 Luxembourg