COMMISSION OF THE EUROPEAN COMMUNITIES

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MULTIANNUAL PROGRAMME
OF THE JOINT RESEARCH CENTRE
1980 - 1983

(presented by the Commission to the Council)

TABLE OF CONTENTS

PART 1 : INTRODUCTION

A. Proposal for a new multiannual programme 1980-1983

1. This document is a formal proposal for a new multiannual programme of the Joint Research Centre, covering a four-year period from 1980 to 1983 inclusive.

   With effect from 1 January 1980, it will prolong and replace the current four-year programme, which was started on 1 January 1977 and in principle will terminate on 31 December 1980.

2. The Council Decision of 18 July 1977 (1) adopting a research programme to be carried out by the Joint Research Centre on behalf of the European Atomic Energy Community and the European Economic Community (1977-1980) makes provision for the programme to be reviewed during the third year (1979).

   It also provides that the review may lead to the adoption by the Council of a new four-year programme in accordance with the appropriate procedure.

3. After reviewing the activities in progress, their stage of advancement, the results achieved, the difficulties encountered, and the prospects they hold out in view of the evolution of requirements, the Commission considers it expedient to make certain adjustments and reorientations, and to launch a number of major operations.

4. Accordingly, it is proposing the adoption of the new multiannual programme (1980-83) of the Joint Research Centre, which is described below in terms of its justification, structure, objectives and funding.

B. The role of the Joint Research Centre

Over the last 5 years, the JRC has gone through a period of reorientation which, in co-operation with its consultative bodies, has led to the definition of a clearer role for it and of the activities to be carried out under it.

The results of the first two years of the programme have led the JRC to conclude that its role is developing in the right direction, that it is integrated better than in the past into the context of the sectoral policies of the Community, and that the JRC has the capacity to execute the tasks which have been entrusted to it.

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(1) Official Journal L 200 of 8 August 1977

2. The Commission has recently described the JRC's role within the Community science and technology policy (1).
It can be summarized as follows :

a) The execution of programmes of a "central" nature : the concentration of the JRC on research activities - which justify the establishment of a broad research potential at Community level, - which call for the centralization of facilities or functions (e.g. by the creation of large-scale installations), - in which the JRC can act as a focal point or catalyst for co-ordination at Community level, - and finally in which it can promote the application of new technologies throughout the Community.

b) The performance of a public service role : the JRC is developing this by meeting the needs of Government organizations, universities and industry for specialized equipment, know-how, products and services. A significant factor in this respect is the independent position of the JRC and its impartial judgment.

c) The provision of services to the Commission : the JRC can act as the Commission's own tool in the provision to it of scientific and technical expertise and support in the formulation and implementation of the sectoral policies of the Communities. An important new development in this respect is the contribution which the JRC can make to scientific and technical co-operation with the developing countries within the development policies of the Community.

3. In order to consolidate this role and in view of the results in the last two years in the execution of the present programme, the JRC considers that its new programme should broadly represent a continuation of the present one. But, at the same time, the research carried out under this programme requires certain changes of emphasis and direction due to the attainment of certain milestones, or because it is proving necessary to adapt this research to the evolution in the requirements of the Community and to developments in the Commission's sectoral policies; or to take into account the development of research carried out under the indirect action programmes; or finally to draw lessons generally from the experience it has acquired.

In this last respect, the JRC has been particularly guided by the concern to ensure continuity in its research to enable the Community as a whole and itself to make full use of the investments made in the activities put in hand under the present programme, and by the need to optimize the use of its resources by concentrating them further into activities of significant dimension.

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(1) Communication from the Commission to the Council of 30 June 1974 "Common Policy for Science and Technology" - see Supplement 3/77 to the Bulletin of the European Communities.

C. Lessons from the current programme

The following assessments can be made from the results of the present research programme, which is being carried out in close association with the indirect action programme :

1. Reactor safety

The execution of this, the largest programme among the JRC's activities, is being carried forward with success. The construction of the LOBI loop has been completed and plans should be made to exploit the considerable investment which this represents through an extensive experimental programme culminating in in-pile experiments. Whole-core accident, fuel-coolant interaction and post-accident heat removal problems are receiving increased attention. The prospects of cooperation in this area of research with the United States' Nuclear Regulatory Commission highlight the value of the JRC's work. More emphasis will also be laid on the more theoretical activity of reliability and risk assessment. The concern voiced in some political circles and by the general public on the development of nuclear energy can only serve to emphasize the value of this area of research;

2. Plutonium fuels and actinide research

Again in the context of concern for nuclear safety, JRC activity in this highly specialized field is centred on long-term objectives. Work is proceeding according to schedule. No external or internal factor would seem to suggest that the present policy should be amended.

3. Management of nuclear materials and radioactive waste

It would appear that the part of this programme which deals with chemical separation and transmutation of actinides will soon reach a stage where a decision will have to be taken at both Community and world level on the continuation of this alternative option to current waste management methods.

The models for assessing the long-term risks of radioactive waste storage are being given practical application in certain specific geographical sites. It may therefore be considered that this part of the programme is entering into a phase of active application. The problems posed by radioactive waste throughout the fuel cycle require deeper study and offer development potential.

Lastly, the work on reactor component decontamination is directed towards the general line of decommissioning of nuclear plants, a preoccupation which is beginning to make itself felt at world level. In view of this trend, new developments should be considered in the future.

4. Solar energy

The "Habitat and thermal conversion" project is being actively carried forward in conjunction with the Indirect Action programme and within the International Energy Agency's Implementing Agreement on solar energy; the prime importance of the JRC's work in this field is widely recognized.

The construction of the European Solar Test Installation (ESTI) is nearing completion. Its elements should come into operation progressively during 1979; the task will then be to exploit in 1980 this substantial investment for the benefit of European research bodies and industry.
It would appear quite justified to intensify this programme.

The programme is designed to play a special role in the provision of services in favour of the developing countries. This provision of services is derived in particular from the Communication of the Commission to the Council (1) on energy co-operation with the developing countries.

5. Hydrogen

1978 has been marked by a"world first"with the putting into operation of a closed-circuit loop corresponding to the MK 13 (H_2SO_4/HBr) cycle. The JRC also plays the role of project leader in the production of hydrogen within the International Energy Agency and international co-operation is being vigorously established in this field.

Whereas the technical obstacles to producing hydrogen from water are being progressively overcome, the fact still remains that any prospects for economic competitivity are long-term ones. In this perspective thought should be given to the method to be adopted to maintain technical knowledge at an adequate level until such time as it can be applied on an industrial scale. The problems of hydrogen transport and storage, for their part, retain constant world-wide attention as this energy vector is of considerable technical and economic interest and is environmentally positive.

6. Thermonuclear fusion technology

The conceptual studies of a future demonstration reactor are being continued : the JRC is making efforts to assemble the European laboratories interested in these studies. The engineering problems are being tackled in a practical manner with research in materials for post-JET machines.

(1) COM (78) 355 final of 31 July 1978.

The basic work for intensification of these activities is being pursued both in conceptual studies and design work and in research on materials. The installation and operation of the cyclotron is scheduled for the middle of 1980. Discussions on the new research programme for 1979-1983 in controlled thermonuclear fusion have revealed the need to intensify the Community's efforts to solve fusion technology problems. The JRC has a duty to participate in such efforts.

7. High-temperature materials

This relatively new activity has quickly reached a high degree of maturity. The Petten Establishment's role as a meeting point is recognized; research proper and work on setting up highly-specialized test installations have been carried forward quickly. Participation in COST action 50 (1) is giving a new dimension to this work. In view of the limited staff resources available for the programme, a great deal of selectivity will have to be exercised in future in the choice of new activities.

8. Environment and resources

The various projects are being implemented according to schedule, in close collaboration with the Indirect Action programme and with the Environment and Consumer Protection Service. Discussions both within the Commission and with the Member States' competent authorities point to the importance of the problem of chemical substances in the environment and the need to push forward the development of ECDIN (2). Concentration of the JRC's research on this "chemical products" line should rapidly bear fruit.

As regards remote sensing from space, the final report on the AGRESTE project has been acclaimed by NASA. The recent launchings of the HCMM and NIMBUS-7 satellites have given the new TELLUS and EURASEP programmes their full development. The OCS (3) airborne experiment has revealed how excellent co-operation between the numerous associated laboratories can be organized around such projects. It is increasingly evident that there is an application potential for remote sensing techniques in both agriculture and marine pollution. The JRC's early effort in this field deserves to be continued and intensified.

(1) COST action 50 : action on materials for gas turbines carried out within European Cooperation on Scientific and Technical Research (COST).
(2) ECDIN : Environmental Chemicals Data and Information Network.
(3) OCS : Ocean Colour Scanner.

9. Measurements, standards and reference techniques (METRE)

In the nuclear field, the Central Bureau of Nuclear Measurements is successfully maintaining its central position in the highly specialized scientific area of nuclear standards. Since the trend in the work load in this field is hardly on the decrease, here again the problem of selecting objectives and optimizing resources and existing capacities arises. In so far as the non-nuclear part of the METRE programme is concerned and leaving aside support for the Community Bureau of Reference (CBR), the question is to determine how far the activities which the JRC has carried out so far tally with its specific role as described above in view of the development of cooperation in this field.

10. Service and support activities

During both 1977 and 1978 the Commission has widely used the JRC's scientific and technical expertise both in connection with development policy and participation in INFCE, in the form of support for the inspections of the Safeguards Directorate and in the evaluation of demonstration programmes. Resources allocated to these various tasks already appear too limited to satisfy the demand. Other activities, such as the informatics research programme or training and education tasks, are producing positive results and should be continued. Lastly, the operation of the HFR reactor continues as an example of one of the JRC's public service rolesin the sector of large-scale installations.

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The Advisory Committees on Programme Management have been called upon at regular intervals to give Opinions on the execution of the present programme. These Opinions have been transmitted to the Council and to the Commission according to the relevant legal provisions.
These Opinions reflect the positive views of the experts of the Member States on the execution of the activities for which they are competent. The discussions on which the Opinions were based have largely inspired the analysis set out above.

D. Preparation procedure

1. The preparation of this programme proposal has involved a long and complex procedure, which started in the early months of 1978 and which called for the participation of all the Centre's scientific and technical staff.

   The researchers and responsible officials at all Centres have been involved in the study, selection and delimitation of the possible areas of activity, where necessary in close collaboration with those in charge of the indirect action projects and the representatives of the Directorates-General responsible for the sectoral policies concerned.

   On the basis of the preliminary guidelines drawn up by the Director-General in March 1978, thirty discussion groups and the same number of working parties have worked out specific proposals.

   These were put forward at internal "hearings", held in July 1978, which were open to all the staff. In the light of the results, more stringent guidelines were laid down by the Director-General to enable the working parties to prepare "programme modules", i.e. a number of basic units which could be put together to form the overall proposal. Over 400 researchers in total helped with the internal preparatory work.

2. At the level of external consultation, the Advisory Committees on Programme Management (ACPMs) were called upon from November 1978 onwards to give their first reactions to the technical content of the modules. In a second stage, they were formally consulted at the request of the General Advisory Committee (GAC) on those parts of the proposal that came within their responsibility.

3. In the course of January 1979, the GAC held an exploratory discussion, during which it reviewed the various options open for the contents of the future programme.

   In the light of the views expressed during this debate, the Director-General prepared a preliminary draft proposal, which was placed before the Committee at a further meeting on 21 and 22 February, during which it adopted the formal Opinion appended to this document.

4. On 5 and 6 March, the Scientific and Technical Committee (CST) was formally consulted on the nuclear section of the preliminary draft, and formulated an Opinion, which is likewise appended to this document.

5. On these bases, the Director-General of the JRC has drawn up this proposal, which was adopted by the Commission on 19 March 1979 for transmission to the Council, the European Parliament and the Economic and Social Committee.

PART 2 : PROPOSAL

A. Programme description

1. Orientation

The programme proposed for the period 1980-83 does not differ essentially in its orientation from the 1977-80 programme. It is built around a limited number of key topics :

- matters of priority concern in nuclear safety;
- the development of future forms of energy;
- the study and protection of the environment;
- the development and execution of reference measurements;
- the provision of specialized scientific and technical support for the Commission's sectoral activities.

2. Objectives

With regard to its objectives, the programme sets out to :

a) take full advantage, in significant experimental programmes, of a number of investments, which were authorized during the preceding period and which are now in the final stage of implementation (the LOBI loop for reactor safety, cyclotron for fusion materials and the ESTI solar test installation), and in the same spirit to give to certain parts of the research an operational content (the ECDIN project in the protection of the environment and the reinforcement of the High Temperature Materials Information Centre).

b) bring a number of research topics which hitherto have been confined to preliminary studies (chiefly on design) to a more advanced stage of development by the commissioning of experimental installations (the SUPER-SARA project in reactor safety, several projects on the management and storage of radioactive waste, and the magnetic isotope separator project at the CBNM).

c) wind up, in the course of the programme, a number of projects which either have less priority or are less well adapted to the specific role of the JRC (the own research section of the non-nuclear METRE programme), or which do not warrant continuation at current level under present circumstances (the actinide incineration project in radioactive waste management and storage, decontamination of power station components, thermochemical production of hydrogen.

d) launch a limited number of new projects (storage and transport of energy, indoor pollution in the protection of the environment, solar power stations, and the tritium testing laboratory in fusion technology).

e) and lastly follow up the activities in progress under the 1977-80 programme for the remainder of the topics envisaged, the only adjustments being those called for by management experience or by changing requirements.

All in all, the evolution of the programme is more apparent in the breadth and quality of the projects to be carried out than in the areas it embraces.

At a first evaluation, half of the programmes proposed can be considered as a continuation of present activities, though with certain adjustments (as set out above) required either by the experience of managing the programmes or by the evolution of requirements. The other half of the programmes represents a significant evolution, whether totally new actions (some 10% of the total), or, within the same research areas, a significant development in their direction or in the nature of the work undertaken (some 40% of the total), or thirdly actions which are substantially reduced (a small percentage).

3. Structure

The programme centres around six research areas (as against five in the 1977-80 programme) :

The area "Nuclear Safety and the Fuel Cycle" is subdivided into four programmes :

A.1. Reactor Safety

A.2. Plutonium Fuels and Actinide Research

A.3. Safety of Nuclear Materials

A.4. Safeguards and Management of Fissile Materials

The fact that the programme on Safeguards and Management of Fissile Materials comes under this heading rather than among the support projects is due to the scale of the research that needs to be done and its potential value as a support to the work of the IAEA.

The area "Future Forms of Energy" is again subdivided into four programmes :

B.1. Solar Energy

B.2. Hydrogen Production, Storage and Transport of Energy

B.3. Thermonuclear Fusion Technology

B.4. High Temperature Materials

Programme B.2. takes account of the evolution of the work, and provides for the research to be extended to techniques of storing energy in forms other than hydrogen.

The area "Study and Protection of the Environment" comprises two programmes :

C.1. Protection of the Environment

C.2. Remote Sensing from Space

In view of their homogeneity, it seemed expedient to group all the activities associated with Remote Sensing from Space under programme C.2. rather than distribute them according to their uses.

The area "Nuclear Measurements" is dealt with in a single programme of the same name. Owing to its orientation, the non-nuclear section of the METRE programme is included in topic E under the heading "Support to the CBR"

The area "Specific Support for the Commission's Sectoral Activities" is subdivided into six programmes :

E.1. Informatics

E.2. Support to Safeguards

E.3. Support to the Community Bureau of Reference

E.4. Training and Education

E.5. Utilization of Research Results

E.6. Provision of Scientific and Technical Services on Request

There is no separate programme of support for another important sectoral activity, development aid. Owing to the specific nature of the contributions the JRC will be called upon to make, provision for such support is made under the appropriate programmes, in particular Solar Energy, Remote Sensing and Training.

Lastly the area "Operation of Large-Scale Installations" is represented for the moment by one programme only relating to the operation of the HFR reactor.

The structure thus adopted should take into account the specific character of the research objectives, and assure efficient technical and financial management of the programmes. As in the past, moreover, a close link will be established with the indirect action programmes on topics similar to those being studied by the JRC (mainly applicable to programmes A.2, A.3, B.1, B.2, B.3, C.1).

4. Contents

A.1. Reactor safety

As the most ambitious of the JRC programmes, the reactor safety programme utilizes the nuclear facilities of the Centre to the full.

For the most part, the research is of a confirmative nature and is intended to back up the work of the licensing authorities with experiments and detailed theoretical analyses. Apart from some activities of a horizontal nature in areas common to every type of reactor, the projects are mainly focused on the safety aspects of light water reactors and of liquid metal cooled fast breeder reactors. The emphasis of the programme is on a few major experiments, simulating abnormal events of very low probability but with significant consequences.

In addition to the licensing authorities a programme of this type meets the requirements of the power plant operators and of the nuclear construction industry.

The programme breaks down into eleven projects - a large number, but one that in no way implies dispersal of resources, but rather the intensity of the effort devoted to this field.

a) Projects more specific to light water reactors :

- project LOBI : an experimental out-of-pile study of the loss-of-coolant phenomenon in light water reactors;

- project SUPER-SARA : an in-pile experiment simulating the behaviour of light water reactor fuel in the event of coolant loss;

- projet LWR primary circuit integrity : early detection of faults in light water reactor vessels;

b) projects more specific to breeder reactors :

- project LMFBR subassembly thermohydraulics : modelling of the thermohydraulic behaviour of fuel assemblies in abnormal situations;

- project LMFBR mechanical tests : study of certain aspects of the behaviour of structural materials;

- project EAC : development of codes to describe scenarios of abnormal situations;

- projects PAHR and PAHR in-pile : theoretical and experimental study of molten core behaviour, including in-pile tests. In accordance with the opinion of the General Advisory Committee, some of these tests are to be the subject of a special decision during the course of the programme.

- project CONT : study on the behaviour of structures and containments subjected to accident stresses.

c) general projects :

- project FCI : study of fuel-coolant interaction under accident conditions;

- project Reliability and Risk Assessment : analysis and collection of data on reactor reliability and risk assessment.

It should be noted that this "Reactor Safety" programme is intended to include a large element of international co-operation, with the US Nuclear Regulatory Commission co-operating in the FCI, SUPER-SARA and PAHR projects, and EPRI (Electric Power Research Institute, USA) and JAERI (Japan Atomic Energy Research Institute) in the SUPER-SARA programme. It should be further recalled that the LOBI project has been financed at the start by the German Research Ministry.

A.2. Plutonium fuels and actinide research

This programme comes partly under the heading of fast reactor fuel development and partly under that of fundamental research on actinides. It is mainly being conducted in the specialized laboratories of the European Institute at Karlsruhe, and is subdivided into three projects :

- Utilization limits of plutonium fuels : their behaviour is studied under normal and abnormal conditions;

- Safety of the plutonium fuel cycle : theoretical and experimental studies will endeavour to provide an answer to some of the problems raised by the presence of transuranium elements in the fuel cycle;

- Actinide research : a study of chemical bonding in solid actinides. This long-term basic research takes the form of fundamental theoretical studies backed up by solid state physics experiments on pure samples prepared and characterized in the laboratory.

A.3. Safety of nuclear materials

The programme centres chiefly on problems relating to the treatment and temporary or permanent storage of radioactive waste. The aim of the theoretical and experimental research is the safety evaluation of waste management procedures.

The programme is divided into four projects :

- Risk evaluation : study of safe waste management techniques;

- Protective barriers : study of natural and artificial barriers to the migration of radionuclides into the biosphere;

- Actinide separation and actinide monitoring : studies of the chemical insulation and control of these very long-life elements.

In this programme, the use of hot cells will be considered for experiments with a more direct application on industrial scale.

Moreover, with regard to the decommissioning of the Ispra I reactor, which ought by its nature to come within the scope of this programme, the Director-General reserves the right, in accordance with the opinion of the General Advisory Committee, to examine the decommissioning operations from the viewpoint of safety requirements and in the light of other projects in this field which are to be carried out under the corresponding indirect action programme.

A.4. Fissile materials control and management

Continuing concern to strengthen safeguards and fissile material management methods calls for a sustained research and development effort. In close collaboration with the Euratom Safeguards Directorate, the national laboratories, the management of nuclear installations and the officials of the IAEA, the JRC intends to step up its contribution in this field. The aim of the proposed programme is to develop various safeguards techniques for application in the main types of nuclear installations. The programme is subdivided into four projects according to the techniques being studied :

- the first is concerned with the acquisition of data for materials accountancy and the evaluation of the material balance;
- the second relates to the development of measurement methods and instrumentation and of techniques for evaluating the isotopic composition of irradiated fuels;
- the third is a study of containment and surveillance techniques;
- the fourth and last is devoted to the study of safeguards systems for the whole of the fuel cycle.

B.1. Solar energy

Against the background of the substantial efforts being made in the Community to develop solar energy, the JRC intends to follow up a number of specialized tasks which correspond more to its own role than others. They are summed up in four projects :

- project ESTI : exploitation of a large testing facility under natural or simulated radiation for both thermal and photovoltaïc systems;
- project Habitat : studies of systems that permit the use of solar energy in all seasons, and of high-temperature systems for industrial and agricultural applications;
- project Solar power plants : a contribution, through materials research and design studies, to improving the economic competitiveness of power plants;
- project PPC : basic reasarch on new processes for the conversion and storage of solar energy.

Provision is made within the solar energy programme for technical assistance to developing countries.

B.2. Hydrogen production, energy storage and transport

In the development of new energy sources, a great deal of attention has been devoted to the sources themselves and to systems of production. Nevertheless, the storage and transport of the energy produced are matters that should not be overlooked; in many cases, they are an essential requirement for the economic utilization of the new systems, whether because of the intermittent nature of the source (solar energy), of because of the mode of utilization (mobile applications), or because of the distance between the centres of production and consumption. In these respects, hydrogen holds out attractive prospects - hence the JRC's interest in the production of this energy carrier.

The project on the thermochemical production of hydrogen is a continuation of the research on a scale adapted to the evolution of the energy scene, whereas the advanced studies on energy carriers and the systems studies are an extension of the activities towards energy transport and storage problems through systems analysis and the testing of components.

B.3. Thermonuclear fusion technology

The JRC's work on fusion is closely linked with the Community's research and training programme in the field of fusion and plasma physics. It is concentrated on technological problems, in which the experience gained with fission reactors can be turned to good use, and is subdivided into six projects :

- conceptual design studies on fusion reactors : a contribution to the design of post-JET machines;
- blanket technology studies : an essential technological component of the future reactor;
- studies of structural materials : notably the evolution of their properties under irradiation;
- studies on advanced materials : chiefly exploratory;
- operation of the cyclotron : experimental research on the irradiation of materials;
- preparatory work for a tritium testing laboratory.

B.4. High temperature materials

This relatively new programme is intended to encourage within the Community the development of these materials which are necessary for the energy technologies of the future.

The work is concentrated on three closely connected projects: a High Temperature Materials Information Centre, which relies on the skills developed and maintained within the research project Materials and Engineering Studies, while the quantifiable data are stocked together in the Data Bank which will be developed in the third project.

C.1. Protection of the environment

Within the very large scope of the problems posed by the protection of the environment the JRC proposes to concentrate its activities on a very limited number of research areas and thus to continue the rationalization effort begun in 1977.

Apart from a project devoted to the theoretical and experimental study of the impact on the environment of fossil fuel power plants, in particular the atmospheric pollution which they cause, all the projects are connected with the problem of the introduction of toxic chemical substances into the environment.

The projects are five in number, and are as follows:

- the ECDIN project, which is given a special priority, is tied to the transition towards an operational stage of an information and data network on chemical substances;

- the project Exposure to Chemical Products which is broken down into a sub-project Indoor Pollution, a new activity the aim of which is to make an inventory of the sources of this pollution and to analyse and characterize these pollutants; and a sub-project Organic Substances, which is concerned with the development of analytical methods of high precision and with the preparation of reference substances in this special area;

- the projects Air Quality and Water Quality deal with particular aspects of the pollution of these environments;

- the project Heavy Metals Pollution is devoted to the problems of exposure to these toxic substances and of their effects on health.

C.2. Remote sensing from space

Even though the techniques of remote sensing from airborne platforms and platforms in space have reached an operational stage in certain cases, they nevertheless require research activities to be continued. The bringing into operation of new systems (e.g. microwave radar) or the development of existing systems (e.g. Landsat-D) continously offer new perspectives for their application which require trial and verification. In parallel, access for new catergories of users of these techniques, in particular the developing countries, must be facilitated by the realization of demonstration projects.

Two projects which concern two areas of general interest for the policies of the Community are proposed: a project"Agriculture"and a project "Protection of the Sea".

D.1. Nuclear measurements

This programme is essentially carried out at the Central Bureau of Nuclear Measurements at Geel.

It consists of three projects:

- measurement of nuclear data by means of the large accelerators of the Establishment;
- nuclear reference materials and techniques, which covers the development of these materials which are indispensible to the nuclear industry (and to safeguards). In particular, the examination of the possibilities of production,chemical purification and isotopic enrichment by electromagnetic means of rare actinides is proposed with the aim of arriving at the beginning of European independence in this field, which is dependant upon suppliers outside the Community;
- European Shielding Information Service (ESIS), the aim of which is the dissemination of information on protection against shielding radiation.

E.1. Informatics

These activities, which closely integrate service and research aspects, constitute a framework for hosting the management teams of European informatics programmes.

They are concentrated on two projects of a recognized central character: the project Teleinformatics which places the JRC's activities within the CREST-CIDST plan and the COST actions, and which is tied to the development of the EURONET network; and the project Eurocopi which will improve the provision of information on computer programmes, in particular by studies of programming techniques and languages.

E.2. Support to safeguards

As an independent European centre, the JRC plays the role of reference laboratory for the analysis of samples taken during safeguards inspections.

In addition to analytical verification work, the JRC gives technical assistance to the Safeguards Directorate. This assistance includes the adaptation and checking of devices or complete systems destined for scientific installations.

E.3. Support to the Community Bureau of Reference

The JRC will continue some tasks of co-ordination and organization of specialist groups and will continue in the earlier stages to provide technical assistance in evaluation and statistical analysis of results. A certain number of specialists from the Ispra, Geel and Petten Establishments will participate part-time in this work, which will be accompanied by a certain amount of actual research.

E.4. Training and education

This programme covers the organization of the "Ispra Courses", the subjects of which are closely related to the Centre's research. The number of these courses will be increased, and greater consideration will be given to the specific requirements of the countries connected to the Community by cooperation agreements.

E.5. Utilization of research results

The JRC will make a particular effort to promote the utilization of the results of its research and to facilitate the transfer of technology which originates in patents and know-how derived from its work. The JRC will provide within its programmes a specific support for the Directorate-General "Scientific and Technical Information and Information Management".

E.6. Provision of scientific and technical services on request

This programme covers the JRC's activities carried out at their request in support of other services of the Commission. These services are of two types: technical evaluations which use systems analysis methods, or technical assistance based on the special skills and equipment of the JRC. This latter type of service includes assistance with the technical management of projects derived from the policies conducted by other Directorates General. Such activities are particularly beneficial to the coordination of programmes carried out simultaneously by direct and indirect action.

F.1. HFR reactor

The operation of the reactor will continue to the benefit of the research programmes of the participating Member States (fuel behaviour, basic physics experiments, isotope production) and for the JRC's own requirements (Pu fuels programme, fusion programme, reactor safety programme). Outside customers will also be able to use the irradiation facilities on payment.

During the next programme, the teams will continue to maintain and upgrade the reactor, and to develop and improve the irradiation equipment and apparatus to enable this installation to keep its position among the Community's most important irradiation means.

5. The programmes in relation to the JRC's tasks

The table 1 (p. 21) gives an overview of the manner in which each of the programmes described above relates to one or other of the aspects of the JRC's role within the common policy on science and technology.

In addition to the three essential tasks - central role, public service, support for the Commission - a particular heading indicates the programmes which are connected to an existing indirect action or other actions of the Commission. A particular co-ordination effort obviously takes place within the services of the Commission before this co-ordination is submitted to examination by the external consultative bodies.

Table 1 - The programmes in relation to the JRC's tasks

Role / Programme	Central Role	Public Service	Support to Commission	Connection with indirect action or other actions of the Commission
A1 Reactor Safety	A	A	C	B
A2 Pu fuels	A	B	C	B
A3 Safety of Nuc.Mat.	A	A	B	A
A4 Safeg.&Manag.fiss.mat.	B	A	A	-
B1 Solar Energy	A	A	C	A
B2 Hydrogen	B	A	B	A
B3 Fusion	A	-	-	A
B4 HTM	A	A	C	-
C1 Environment	B	A	A	A
C2 Remote Sensing	A	A	B	-
D Nucl.Measurements	A	A	C	-
E1 Informatics	B	A	A	A
E2 Supp.to Safeguards	-	-	A	-
E3 Supp.to CBR	-	-	A	A
E4 Training and Education	-	A	A	A
E5 Utilization of Research Results	-	B	A	A
E6 Prov.of scient.&techn. services on request	-	-	A	A
F1 HFR	-	A	-	-

A : close correlation

B : some correlation

C : little correlation

- : not applicable

B. Resources required

1. Commencement and duration of the programme

a) The proposed programme covers a four-year period from 1980 to 1983 inclusive. As of 1 January 1980, it will extend and replace the current programme, also of four years' duration, which was launched on 1 January 1977.

b) In this way the Commission proposes to implement the Council Decision adopting the current programme (1), which provides for a review during the third year and for the possibility, at the same time, of adopting a new four-year programme.

In this connection, it should be recalled that the three-year frequency was adopted, first, in order to make due allowance for the normal time-span of the programme decision process and the budgetary procedures that follow it; second, because of the need to carry on the programme over a long enough period to enable significant experience to be gained; and lastly because it is desirable that the JRC programmes should be adapted regularly and fairly rapidly in the light of the progress of activities and the changing requirements resulting from the evolution of various sectoral policies.

c) In applying these principles, the JRC has carried out a careful analysis of the activities in progress, making an overall review of the resources employed and the results achieved, in order to assess the justification, progress, efficiency, success and usefulness of the work.
Some further particulars in this connection will be given later.

d) After concluding this analysis, the Commission feels that the time has come to expand some of the major activities and reorientate others, i.e. to redefine a number of objectives within the context of the broad research areas to which the JRC is contributing.

This redefinition has led the Commission to propose the adoption of a new 1980-83 programme containing similar provisions with regard to the decision procedure.

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(1) Official Journal L 200 of 8 August 1977

2. Staff

a) The total staff complement of the JRC during the new multiannual programme should be 2,260 employees. This is the same level as was laid down for the end of the preceding programme, including the JRC staff then assigned to the ESSOR complex.

b) An indicative breakdown of this staff between the various programmes is given in table 3 (p. 27).

As in the current programme, the staff complement includes :

- personnel directly involved in research (including all categories of employees, not only graduate staff); these are the research staff, the most representative unit for measuring the volume and intensity of a programme;

- a portion of the personnel commensurate with the requirements of the programme for scientific and technical support (services rendered by the computer centre, central workshops, medium activity laboratories, etc.);

- and lastly, a portion assigned to all general services (akin to public services), and distributed among the various programmes in proportion to the total number of research staff.

These distinctions were originally made because of a need for greater clarity in the internal organization and management of the Centre; this need led to an appropriate change in the structure of the budget from 1977 onwards.

c) In foreseeing the level of staff at 2,260, the Commission would be complying with the decision taken earlier to reduce the JRC's staff by 80 posts in four years.

Although the JRC's role could be considerably strengthened by a gradual expansion of its activities, and although its staff is a mere fraction of the research personnel engaged in Europe in the same fields, it does not seem expedient at this stage to attempt any reinforcement of team numbers, but rather to take steps to increase their flexibility.

Hence the work of the JRC will be directed more towards giving proof of the optimum efficiency of its laboratories and towards wider participation by its technicians in the world of research.

However, the Commission wishes to point out clearly that no further reduction should now be made in the JRC's staff, as otherwise this work force, which in the last few years is recognized to have acquired new quality and usefulness, would no longer be capable of carrying out its tasks with the desired efficiency.

d) The decline in the level of authorized staff over the past ten years or more has helped to bring about an overall ageing and insufficient renewal of technical and scientific skills. New recruitment has been possible only to the limited extent that natural wastage is in excess of the required reductions but natural wastage is uncontrollable in its consequences.

Without doubt, the new staff regulations for researchers offer some ways of improving their mobility and the flexibility of teams, and thus assist the necessary rejuvenation and the adaptation of skill profiles in accordance with the activities undertaken. This adaptation of skills is taking place, it must be fully expanded, and it would be regretable to interrupt it. If it is true that a certain amount of staff renewal has almost held stable the overall ageing of the personnel and helped to reinforce some of the scientific disciplines, the factor of insecurity associated with the contract system does not always enable the JRC to attract the proven specialists that some of the projects call for. But at all events one needs to go further and recognize in the first place that an ongoing process of contraction in the authorized staff does not make for sound personnel management.

Accepting that the level of personnel is stabilized, the Commission considers that in the second place agreement should be reached on a recruitment policy based on a multiannual forecast of staff losses. This wastage through resignations, deaths, transfers or retirements, amounts to forty per year. Though this figure may seem substantial, it is barely 2% per annum of the total staff, and even less in the active research sector. Owing to the average age, movements are more numerous in the general services, which are already strained to the limit and must be maintained at more or less the present level.

e) In anticipation of an enlargement of the Community, an early retirement scheme is now being studied by the inter-institutional services, and is expected to enter into force in the near future. Thus the staff might be given the option of voluntary retirement at sixty, which would speed up the rate of departures over a certain period of time.

In view of the total number of staff likely to be leaving, the Commission is proposing a number of temporary measures designed to telp in readjusting the profile of the JRC staff. With effect from the first year of the programme, the JRC would have 70 posts available in excess of the authorized number to offset the effects of natural wastage; the Commission would undertake to restore the situation to normal as early as possible, and in any case before the last year of the programme.

This room for manoeuvre would enable the JRC both to launch these new activities in optimal conditions of dynamism and skill, and to conduct an overall recruitment policy with adequate medium-term prospects.

At the practical level, these temporary measures might be the subject of special agreement by the Council and find a temporary solution through budgetary channels. The Commission would undertake to manage these posts in the joint interest and would keep the Council regularly informed.

The cost of this operation would be not more than 2% of the personnel expenditure.

3. Programme allocation and budget appropriations

a) The overall budget resources required for the implementation of the proposed programme, given the specified technical contents and time-scale, is estimated at 543 million EUA for the four-year period 1980-83. This amount covers all expenditure in respect of the programme and takes account of any revenue that can be identified at this stage.

In other words, these appropriations will cover all the JRC's activities including those carried out for other Directorates-General. The latter are not taken into account in the programme envelope for the current period. The proposed layout complies with the change in the budget structure requested by the budget authority.

In accordance with the arrangements adopted by the Council for the current multiannual programme, this envelope includes :

- an amount of some 276 million EUA for personnel expenditure estimated as at 1 January 1980 on the basis of hypothese envisaged by the Commission in early 1979. Following any Council decision adjusting the level of remunerations, the Commission will re-assess the expenditure and notify the budget authority of the effects of the re-assessment on the programme envelope.

- an amount of some 267 million EUA for operating expenditure, this being a flat-rate assessment expressed in current values;

It should be noted, moreover, that this total amount includes an provisional amount of 6.77 million EUA for in-pile experiments in the context of the PAHR project (Programme A.1 Reactor Safety). This amount will not be used until favourable opinions have been received from the relevant Advisory Committee on Programme Management and the General Advisory Committee; these opinions ought to be on hand by the end of 1981.

An indicative breakdown of funds and staff between the proposed programmes is given in the table 3 (p. 27). Moreover, each of the technical sheets in the Annex gives a detailed breakdown of the requirements for staff and specific appropriations (investments, operating expenditure and contracts) for the programme in question. It should be noted that the contracts to be concluded by the JRC will not overlap at any point with those of the indirect action programme.

b) The allocation of resources between the six research topics in the programme is as follows :

- Nuclear safety and the fuel cycle 48 %
- Future forms of energy 16 %
- Study and protection of the environment 10 %
- Nuclear measurements 9 %
- Specific support to the Commission's sectoral activities 7 %
- Operation of large-scale installations 10 %

This means that 74 % of the total funds is concentrated in the field of energy and the environment, whilst the remaining 26 % is mainly to cover the JRC's public service functions.

It should be recalled in this connection that the JRC's activity until 1972 was entirely devoted to the nuclear field. A gradual evolution has allowed a balanced solution to be reached, with half of the activities remaining in the nuclear field, and the other half concerning other research sectors.

c) In comparison with the preceeding programme, the ratio between staff expenditure and scientific and technical operating expenditure has been slightly adjusted in favour of the latter, mainly because of the beginning of major technological programmes. The proportions are 51% and 49% respectively.
The table below summarizes the general distribution of funds (estimated : not entirely accurate due to computer processing).

Table 2 - Distribution of funds into main categories

NATURE OF EXPENDITURE	Total 1980-83	%
A. Personnel expenditure	276.0	51
B. Operating expenditure		
B.1. Specific scientific appropriations	89.6	16
B.2. Specific support appropriations (infrastructure and laboratory equipment)	177.0	33
Subtotal B	266.6 *	49
G R A N D T O T A L	542.6	100%

* Including the provisional amount of 6.77 million EUA reserved for the PAHR project.

TABLE 3

SUMMARY TABLE

OF THE 1980 - 1983 PROGRAMME

Appropriations in million EUA

Item	Programme	R.S.	T.S.	Specific appropriations for the programme	Specific appropriations for services	Total appropriations
A1	Reactor Safety	287	679	36,680	40,602	155,930
A2	Plutonium Fuels and Actinide Research	117	205	9,902	23,823	59,230
A3	Safety of Nuclear Materials	52	114	2,781	5,234	22,235
A4	Fissile Materials Control and Management	60	120	2,677	5,455	23,114
	Total Nuclear Safety	516	1,118	52,040	75,114	260,509
B1	Solar Energy	63	122	5,381	5,160	25,818
B2	Hydrogen Production, Energy Storage and Transport	40	79	2,253	3,332	15,447
B3	Thermonuclear Fusion Technology	63	130	4,988	7,161	28,409
B4	High Temperature Materials	38	63	3,167	4,928	15,976
	Total New Energies	204	394	15,789	20,581	85,650
C1	Protection of the Environment	90	174	4,636	8,939	35,220
C2	Remote Sensing from Space	50	97	3,060	4,567	19,736
	Total Protection of the Environment	140	271	7,696	13,506	54,956
D1	Nuclear Measurements	113	194	7,107	16,562	47,947
E1	Informatics	26	52	1,641	2,817	10,923
E2	Support to Safeguards	18	37	1,529	2,847	9,036
E3	Support to the Community Bureau of Reference	7	13	371	773	2,725
E4	Training and Education	9	17	544	763	3,463
E5	Utilization of Research Results	4	14	510	453	2,760
E6	Provision of Scientific and Technical Services on Request	32	62	376	2,877	10,949
	Total Specific Support to the Commission	96	195	4,971	10,530	39,856
F1	HFR Reactor	41	88	2,039	40,688	53,705
TOTAL		1,110	2,260	89,642	176,981	542,623 *

R.S. = Research Staff
T.S. = Total Staff

* including a provisional amount of 6.772 reserved for the "PAHR" project.

C. Implementation procedures

1. Internal management

The rationalisation measures for the internal operation of the Centre, which were put in place during the preceding programmes, make possible a type of research management approaching industrial management, while maintaining the flexibility necessary for carrying out a scientific activity. The adoption of the matrix structure in the organisation of the work and the use of the functional budget, which reproduces the picture of this structure at financial level, are the most significant elements of this rationalisation. It has been completed by the realisation of a unified system of JRC publications. In addition to improving and further developing the tool thus created, efforts under the next programme will be directed mainly towards evaluation of research.

2. Evaluation of research

2.1. Motivation

For some years, the problems associated with the evaluation of research and the exploitation of results have been receiving increasing attention, and the JRC has been fully conscious of developments in this area. Since it is anxious to make the right choices and assess the true impact of its research, and motivated particularly by the information obtained from the Milan symposium on science and technology policy (1976) and the Copenhagen symposium on the evaluation of research and development (1978) in which it was an active participant, the JRC is gradually setting up a number of procedures which should provide it with greater insight into the manner in which it fulfils the specific tasks assigned to it and into the exact extent to which its research forms a valuable part of the entire European R&D network.

2.2. In-programme evaluation

Since it began to diversify its programme (1973) and more markedly, during the period 1977-80, the JRC has endeavoured to provide an accurate definition of the objectives of its research and the aims of its programme, to assess the implementation periods, the decision points and timetables for the commitment of financial resources and staff.

Corresponding to this definition phase is a phase of monitoring and evaluation in which the effectiveness of the current programme is analysed by the achievement of its objectives and which enables any adjustments which may be necessary to be carried out.

Special attention was given in this connection to the appropriate presentation of records and operational reports.

A system of regular half-yearly reports on the progress of the programme has been set up. Each of these reports describes in particular the objectives for the period in question, the extent to which these objectives were attained and, where they were not attained, the difficulties encountered, reasons for the delay and any re-adjustments which have proved necessary. It also indicates the main important points for the next six months, which will be covered by the following half-yearly reports. As well as being useful for the evaluation of the programme, these reports are also beneficial for the direct administration of the research, since they oblige the researchers to undertake planning of their activities. However, it must be admitted that this planning generally remains fairly rudimentary, being closely dependent on the type of research undertaken.

Another important evaluation factor is the analysis of the budget and staff allocated to a programme or project. Implementation of the functional budget makes it possible to divide the entire operating costs of the Centre among the research objectives. This allocation takes place monthly on the basis of a financial report which provides details of the costs of the infrastructure, technical assistance and the scientific teams involved. These costs are allocated to the different projects on the basis of their respective use of laboratories, teams, and installations; this utilization is measured, as appropriate, by monthly accounts and predetermined weighting coefficients.

The internal management bodies therefore have available a table showing the progress of research and budgetary follow-up information. Four levels of supervision can be identified internally :

- at JRC level : the Director-General assisted by the Programme Management Directorate of the JRC, which participates more in the evaluation of results than in the evaluation of the programme as a result of its responsibilities for coordination with outside bodies;

- within the programme : the Programme Manager, at Ispra, the programme managers form part of a Projects Directorate;

- at project level : the Project Leader;

- at sub-project level : the coordinator of the activity concerned.

In addition to this internal management structure, the General Advisory Committee and the Advisory Committees on Programme Management play an important part in evaluating the programme and their opinions affect the internal decision-making processes.

The evaluation of programmes, which takes place at the different internal management levels and is followed by outside bodies on the basis of the progress reports and other available information, indicates, where appropriate, any adjustments which are required in planning in terms of objectives, budgets, and workforce.

It should however be noted that in-programme evaluation is only effective to the extent that the different levels of management are capable of introducing the necessary amendments rapidly, i.e. to the extent that they possess corresponding powers, within the limits of the resources and the objectives of the programme as it has been adopted.

2.3. Evaluation of results

In parallel with the in-programme evaluation, the JRC is endeavouring to evaluate the results of its research, that is to study the effect of its activities on society; this impact may be direct or indirect, immediate or long-term .

In this analysis, the JRC is confronted by the same difficulties as those facing national research laboratories. Since this impact cannot be quantified directly, a number of indicators are used; each of these indicators, in isolation, does not provide the desired answer, but taken together they make it possible to obtain an idea of the extent to which research results are disseminated and used in society. These indicators are linked either to the transfer of information or to cooperation with the outside world.

The first indicators relate to publications (their number, types, quotations from these publications in outside literature), patents and licences and training and educational activities, whereas the second concern work undertaken on behalf of outside bodies under contract or for other Commission departments, and activities in the field of international cooperation. This last-mentioned indicator is particularly significant : the direct comparison of ideas and results with those of other laboratories and institutions which are active in the same field reveals the relative quality of the work undertaken. This quality can be gauged during "meeting point" activities when symposia, seminars or expert working parties are organized. It should be pointed out that this quality is recognized in particular by the conclusion of cooperation agreements relating to specific research to which each partner makes its contribution in equitable fashion. Reference can be made to the active participation of the JRC in recent years in a number of agreements within the International Energy Agency, and the setting up of collaborative projects with the US Nuclear Regulatory Commission.

Lastly, reference must be made to a final indicator to which particular attention is paid by the Director-General and his departments : namely opinions generally delivered by the Advisory Committee on Programme Management at the end of each year, which form an assessment of the work conducted under each programme during the preceding 12 months. These motivated technical opinions represent the periodical conclusion of a continuous review procedure and as a result, a particular significance is attached to them.

During the 1980-83 programme, the JRC will intensify this aspect of the evaluation of results by conducting a precise analysis of the variations of each of these indicators and by studying their particular limitations, for example, the effect of the confidentiality of publications on the dissemination of knowledge, the consequences of granting non-exclusive licences for the interest of potential licencees and the effect of the rigidity of the programme on the possibilities for undertaking work for third parties, etc.

3. Liaison with other institutions and advisory bodies

From the adoption of the multiannual programme which is currently being implemented the Commission emphasized from the outset the importance it attaches to the existence of a permanent dialogue between the institutions and competent bodies of the Member States and the JRC.

This dialogue mainly takes place during the successive stages of programme and budget preparation, decision-taking and implementation and follow-up, either through the internal or external Advisory Committees or through the mechanisms of the Community institutions.

3.1. The Advisory Committees set up by the Council or Commission participate in the preparatory and execution phases. They have played an effective part in the launching, development and success or the JRC's activities through their debates, advice and opinions. A list of these Committees is :

- The Advisory Committees on Programme Management (ACPM), the role of which was clearly defined in the relevant texts (1) "..... it shall be the task of each Committee to contribute, in its advisory capacity, to the best possible implementation of the programme for which it is responsible (in particular the detailed definition of projects) and to assess the results and ensure better liaison between the implementation of the programmes at Community level and the corresponding research and development work being carried out in the Member States".

  In addition, where direct and indirect action coexist, these Committees contribute towards the achievement of a coherent structure for the research undertaken.

  In spite of a certain overloading of the structures of the JRC resulting from the extra work, it it undeniable that the contribution made by these Committees has been extremely favourable and has assisted considerably in the successful development of activities.

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(1) O.J. C 192, 11.8.1977 - Council Resolution of 18 July 1977 on advisory committees on research programme management.

Examination of future programmes in the light of current programmes reveals that the area of competence of the existing committees needs no, or hardly any, amendment or extension. As a result, it is proposed to retain the ACPMs in their present form as listed programme by programme in table 4 (p.33).

- The General Advisory Committee (GAC) set up as part of the reorganization of the Joint Research Centre (1), the members of which are appointed in accordance with a special Council Resolution (2).

  This Committee which maintains the required contact with prevailing industrial and national scientific policies has played a major part in the reorganization and efficient exploitation of the JRC. It also makes use of the opinion of the ACPMs and assists the Director-General in preparing programmes and regularly reviewing the current status of activities.

  The General Advisory Committee has recommended that in accordance with their terms of reference, the ACPMs should be consulted on proposals for future programmes. Their Opinions delivered on these proposals appear in the technical annex together with details of each programme.

  The General Advisory Committee also held an initial general policy discussion on future activities, and in a second phase analysed the specific proposals and delivered the Opinion shown at the end of this document(annex II).

- A number of internal Commission committees; these are consulted as part of the interdepartmental coordination of activities which provides the link to sectoral policies.

- The Scientific and Technical Committee, whose consultation is provided for in Article 7 of the Euratom Treaty which delivered an Opinion on the nuclear section of the present proposal. This Opinion is also included at the end of the document (annex III).

- The Scientific and Technical Research Committee (CREST) which periodically ensures that the role and objectives of the JRC are suitably in accordance with the objectives of and perspectives for a common policy of research on development.

3.2. Dialogue with the Community institutions mainly occurs at the time of the decision-making procedures relating to proposals for programmes and when the programmes which have been approved are translated into annual budgets.

Naturally, the closest possible relations exist at the level of the different institutional bodies, which are :

- the Council : the Atomic Questions Group and the Budget Committee.

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(1) Commission Decision of 13 January 1971, reorganizing the Joint Research Centre (O.J. L 16, 20.1.1971).

(2) Resolution of 17 December 1970 of the representatives of the Governments of the Member States meeting within the Council (O.J. L 16, 20.1.1971).

TABLE 4 : TABLE OF CORRESPONDENCE BETWEEN THE ACPMs, CURRENT PROGRAMMES AND FUTURE PROGRAMMES

CURRENT PROGRAMMES	ADVISORY COMMITTEES ON PROGRAMME MANAGEMENT (ACPM) - EXISTING OR TO BE SET UP	FUTURE PROGRAMMES
I. 1. Reactor safety	"Reactor safety"	A.1. Reactor safety
2. Plutonium fuels and actinide research	"Plutonium fuels and actinide research"	A.2. Plutonium fuels and actinide research
3. Nuclear materials and radioactive waste management	"Management and storage of radiaoactive waste" (in conjunction with indirect action)	A.3. Safety of nuclear materials
(see V.2. below)	"Fissile materials control"	A.4. Guarantee and management of fissile materials
II.1. Solar energy	"Solar energy" (in conjunction with indirect action)	B.1. Solar energy
2. Hydrogen	"Production and utilization of hydrogen" (in conjunction with indirect action)	B.2. Production of hydrogen, storage and transport of energy
3. Thermonuclear fusion technology	"Fusion and plasma physics" (liaison group of the Fusion Associations)	B.3. Technology of thermonuclear fusion
4. High-temperature materials	"High-temperature materials"	B.4. High-temperature materials
III. Environment and resources	"Environment and resources" (in conjunction with indirect action, with the assistance of the Standing Committee for Agricultural Research in respect of the section of agricultural resources)	C.1. Protection of the environment C.2. Remote-sensing from space
IV. Measurments, standards and reference techniques (METRE)	"Reference materials and methods" (in conjuction with the CBR indirect action programme for the non-nuclear section)	
	"Measurements, standards and reference techniques" for the nuclear section	D.1. Nuclear measurements
V. Service and support activities		
1. Informatics	"Informatics"	E.1. Informatics
2. Fissile materials control	"Fissile materials control"	(see A 4 above)
3. Exploitation of the HFR reactor	"Exploitation of the HFR reactor"	F.1. Exploitation of the HFR reactor

- the European Parliament : the Committees on Energy and Research, on the Environment and on Budgets including the Sub-Committee on Control of the European Parliament.

- the Economic and Social Committee : the Section for Energy and Nuclear Questions.

The positions adopted by these institutional bodies have been greatly facilitated in recent years by the substantial preparatory and follow-up activities conducted through the systematic consultation of the Committees which have already been mentioned.

Nevertheless, the whole process of drawing up and adopting research programmes involves a degree of complexity, rigidity and periods of time which are hardly propitious to the implementation of research activities, which require machinery similar to that employed in industrial management.

PART 3 : PROPOSAL FOR DECISION

1. The multiannual research programme for the JRC is based on Article 7 of the EAEC Treaty or Article 235 of the EEC Treaty, depending on which of the programmes is concerned.

   A proposal for decision is given in Annex I.

2. This proposal for decision has been established taking into account the Council Resolution of 17 December 1970 on the detailed rules for the adoption of research and education programmes (1).

(1) Official Journal No. L 16, 20 January 1971

ANNEX I

COUNCIL DECISION

adopting a research programme to be implemented by the Joint Research Centre for the European Atomic Energy Community and for the European Economic Community (1980-1983)

(...../EEC, 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 Treaty establishing the European Economic Community, and in particular Article 235 thereof,

Having regard to the proposal from the Commission presented after consultation, with regard to nuclear projects, of the Scientific and Technical Committee,

Having regard to the opinion of the European Parliament (1),

Having regard to the opinion of the Economic and Social Committee (2),

Whereas in the context of the common policy relating to the field of science and technology the multiannual research programme is one of the principal means whereby the European Atomic Energy Community can contribute to the safety and development of nuclear energy and to the acquisition and the dissemination of information in the nuclear field;

Whereas Article 2 of the Treaty establishing the European Economic Community assigns to the Community inter alia the task of promoting throughout the Community a harmonious development of economic activities, a continuous and balanced expansion and an increase in stability; whereas the objectives pursued by the Community's activities to this end are set out in Article 3 of the said Treaty;

(1)

(2)

Whereas the non-nuclear projects provided for by the Decision appear necessary for the attainment of these objectives;

Whereas the Treaty establishing the European Economic Community has not provided powers required for this purpose;

Whereas the Council has adopted a resolution concerning the coordination of national policies and the definition of Community actions in the field of science and technology (3);

Whereas the programme was drawn up in accordance with the Council resolution of 17 December 1970 concerning the procedures for adopting research and training programmes (4);

Whereas the Italian Government has undertaken to take over until 31 December 1980 the ESSOR complex, made available to it by the Commission, within the meaning of Article 6 (c) of the Treaty establishing the European Atomic Energy Community;

Whereas it is in the common interest to further experiments in reactor safety, and the use of the ESSOR complex is necessary to this end;

Whereas article 3 of Council Decision Nr 77/488/CEE, Euratom of 18 July 1977 provides for a review of the programme during its third year which may lead to the adoption of a new four-year programme;

HAS DECIDED AS FOLLOWS :

Article 1

A research programme as presented in Annexes A and B is hereby adopted for a period of four years, as from 1 January 1980.

Article 2

The global requirements for the total duration of the programme as given in Annex A are estimated at 542.62 million European units of account and a staff of 2,260 agents, the European unit of account being defined in Article 10 of the Financial Regulation of 21 December 1977.

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(3) Council Resolution of 14 January 1974.
(4) O.J. Nr L 16, 20.1.1971, p. 13.

These figures have an indicative value only.

The indicative breakdown of funds and staff is given in Annex B.

Article 3

The programme shall be reviewed during its third year. Such review may lead to a Council Decision on a new four-year programme in accordance with the appropriate procedure.

Article 4

The dissemination of the information resulting from the implementation of the non-nuclear parts of the programme shall be carried out in accordance with Council Regulation (EEC) No. 2380/74 of 17 September 1974, adopting provisions for the dissemination of information relating to research programmes for the European Economic Community (5).

Article 5

The Commission shall be responsible for the implementation of the programme and, to this end, shall call upon the services of the Joint Research Centre.

Article 6

The Council decision 77/488/EEC, Euratom is repealed.

Done at Brussels, ...

FOR THE COUNCIL
The President

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(5) O.J. No. L 255, 20.9.1974, p. 1

ANNEX A

RESEARCH PROGRAMME (1980-1983)

A. NUCLEAR SAFETY AND THE FUEL CYCLE

A.1. Reactor Safety (nuclear activity)

The programme consists of the following eleven projects :

- project LOBI : study of loss of coolant accidents in light water reactors;
- project SUPER-SARA : an in-pile experiment on the behaviour of light water reactor fuel in the event of loss of coolant;
- project LWR primary circuit integrity : early detection of faults in light water reactor vessels;
- fast breeder fuel sub-assembly thermohydraulics;
- mechanical tests of fast breeder structural materials;
- development of fast breeder hypothetical accident codes;
- project PAHR : study of the evacuation of residual heat in a fast breeder molten core;
- project PAHR in-pile;
- study of fuel-coolant interaction under accident conditions;
- study of the behaviour of structures and containments subjected to accidental stresses;
- analysis of reliability and risk assessment.

A.2. Plutonium fuels and actinide research (nuclear activity)

The programme consists of the following three projects :

- utilization limits of plutonium fuels;
- safety of actinide cycle;
- actinide research.

A.3. Safety of nuclear materials (nuclear activity)

The programme consists of the following four projects :

- risk evaluation
- protective barriers
- actinide separation
- actinide monitoring

A.4. Fissile materials control and management (nuclear activity)

The programme consists of the following four projects :

- acquisition of data for accountancy and materials balance evaluation;
- development of measurement methods and instrumentation and of methods for the evaluation of the isotopic composition of irradiated fuels;
- containment and surveillance techniques;
- study of safeguards systems for the fuel cycle as a whole.

B. NEW ENERGIES

B.1. Solar Energy (non-nuclear activity)

The programme consists of the following four projects :

- European solar test installation ESTI;
- solar energy for habitat and low temperature applications
- solar power plant materials
- photoelectrochemical and photochemical conversion.

B.2. Hydrogen production, energy storage and transport (non-nuclear activity)

The programme consists of the following three projects :

- thermochemical production of hydrogen;
- advanced studies on energy carriers;
- systems studies.

B.3. Thermonuclear fusion technology (nuclear activity)

The programme consists of the following six projects :

- conceptual studies on fusion reactors;
- blanket technology studies;
- studies of structural materials;
- studies on advanced materials;
- operation of the cyclotron;
- preparatory work for a tritium testing laboratory.

B.4. High-temperature materials (nuclear activity)

The programme consists of the following three projects :

- high temperature materials information centre;
- materials and engineering studies;
- high temperature materials data bank

C. STUDY AND PROTECTION OF THE ENVIRONMENT

C.1. Protection of the environment (non-nuclear activity)

The programme consists of the following six projects :

- project ECDIN;
- exposure to chemical products, in particular, indoor pollution and organic substances;
- analysis of air quality;
- analysis of water quality;
- heavy metals pollution and health effects;
- environmental impact of conventional power plants.

C.2. Remote sensing from space (non-nuclear activity)

The programme consists of the following two projects :

- agriculture
- protection of the sea.

D. NUCLEAR MEASUREMENTS

D.1. Nuclear Measurements (nuclear activity)

The programme consists of the following three projects :

- measurement of nuclear data;
- nuclear reference materials and techniques;
- European shielding information service (ESIS).

E. SPECIFIC SUPPORT FOR THE COMMISSION's SECTORAL ACTIVITIES

E.1. Informatics (non-nuclear activity)

The programme consists of the following two projects :

- teleinformatics
- EUROCOPI

E.2. Support to safeguards (nuclear activity)

E.3. Support to the Community Bureau of Reference (non-nuclear activity)

E.4. Training and education (non-nuclear activity)

E.5. Utilization of research results (nuclear and non-nuclear activity)

E.6. Provision of scientific and technical services on request (nuclear and non-nuclear activity)

F. OPERATION OF LARGE-SCALE INSTALLATIONS (nuclear activity)

F.1. Operation of the HFR reactor (nuclear activity)

ANNEX B

INDICATIVE BREAKDOWN OF STAFF AND FUNDS

Programmes	Total staff	of which research staff	Commitments for expenditure (in MEUA)
A. NUCLEAR SAFETY AND THE FUEL CYCLE			
1. Reactor Safety	679	287	155.93
2. Plutonium fuels and actinide research	205	117	59.23
3. Safety of nuclear materials	114	52	22.24
4. Fissile materials control and management	120	60	23.11
Total	1,118	516	260.51
B. NEW ENERGIES			
1. Solar energy	122	63	25.82
2. Hydrogen production, energy storage and transport	79	40	15.45
3. Thermonuclear fusion technology	130	63	28.41
4. High temperature materials	63	38	15.97
Total	394	204	85.65
C. STUDY AND PROTECTION OF THE ENVIRONMENT			
1. Protection of the environment	174	90	35.22
2. Remote sensing from space	97	50	19.74
Total	271	140	54.96
D. NUCLEAR MEASUREMENTS	194	113	47.95
E. SPECIFIC SUPPORT TO THE COMMISSION			
1. Informatics	52	26	10.92
2. Support to Safeguards	37	18	9.04
3. Support to the Community Bureau of Reference	13	7	2.72
4. Training and education	17	9	3.46
5. Utilization of research results	14	4	2.76
6. Provision of scientific and technical services on request	62	32	10.95
Total	195	96	39.85
F. OPERATION OF LARGE-SCALE INSTALLATIONS			
1. Operation of the HFR reactor	88	41	53.70
GRAND TOTAL	2,260	1,110	542.62*

* including a provisional amount of 6,77 reserved for the PAHR project

ANNEX II

OPINION OF THE GENERAL ADVISORY COMMITTEE

issued at its 25th Meeting (21-22 February 1979) on the multiannual research programme (1980-1983) of the Joint Research Centre.

In accordance with Article 6 of the Commission Décision of 13 January 1971 concerning the reorganization of the JRC, the Director-General established on his own responsibility a preliminary draft of the multiannual programme of the JRC for the years 1980-1983. This preliminary draft was submitted for Opinion to the General Advisory Committee in two versions (documents CCG 250 and CCG 251).

After holding an orientation debate at its 24th meeting on 17 January 1979, the General Advisory Committee at its 25th meeting on 21 and 22 February 1979 under the Chairmanship of Mr. S. AMELINCKX gave a favourable reception to the programmes proposed subject to the comments set out below. It notes that as a whole the proposal corresponds well to the Opinions formulated by the relevant Advisory Committees on Programme Management.

The GAC takes note of the proposal of the Director-General to stabilize the total staff at the level of 2,260 agents, which includes the reinsertion into the programme of 222 persons at present assigned to the exploitation of the ESSOR reactor. This involves an increase in the charges to the Community.

Independently of any question of the programme, it associates itself with the preoccupations of the JRC as regards the ageing of the staff and encourages the Director-General to formulate proposals to remedy this situation.

The General Advisory Committee takes note of the statement of the JRC that the operational credits set out in documents CCG 250 and CCG 251 represent on average an increase of only 3 - 4 % in comparison to the average of the operational credits at net present value allocated to the activities of the JRC as a whole in the 1977, 1978 and 1979 budgets.

The General Advisory Committee makes the following recommendations on each programme :

A.1. REACTOR SAFETY

The General Advisory Committee unanimously recognizes the importance of this programme and its good coherence with the actions carried out at national level.
The Committee considered at length the problem of the inclusion of the SUPER-SARA project into this programme. It takes note of the low degree of priority attributed to the project by the relevant ACPM and of the constraints which its execution would impose ; nevertheless, it recognizes its interest as "insurance" in the event of an unfavourable technical development in the analysis of accidents in pressurised reactors; it values the possibilities of international cooperation which it offers.
However, it was not able to arrive at a convergence of opinion on this subject; it would have wished, in the majority, that the option should not be closed during the first two years of the programme. The Italian members are opposed to any temporary solution.
As regards the project in-pile PAHR, the General Advisory Committee recommends that the study of the feasibility of a European experiment should be actively pursued. The majority requested the provision from the outset of the financial reserves which, in the event of a favourable result of this study and after receipt of the Opinion of the competent instances, would permit the experimental work to be undertaken without delay.
On the rest of the programme, the General Advisory Committee endorses the recommendations of the relevant ACPM.

A.2. PLUTONIUM FUELS AND ACTINIDE RESEARCH

The General Advisory Committee takes note with satisfaction of the activities undertaken and expresses a favourable opinion on the programme.

A.3. SAFETY OF NUCLEAR MATERIALS

The General Advisory Committee shares the very favourable opinion expressed by the relevant ACPM on projects 1 to 4 of this programme; it emphasizes the importance of using the existing hot cells for experiments of more direct application on industrial scale.
It issues an unfavourable opinion on the decommissioning of the Ispra-1 reactor as set out in project 5 of document CCG 251.
It is for the Director-General to examine whether this decommissioning is necessary from safety considerations and in the light of the actions which will be undertaken in the corresponding indirect action.

A.4. FISSILE MATERIALS CONTROL AND MANAGEMENT

The General Advisory Committee expresses a favourable opinion on this programme : it recommends that the increase in staff should be made progressively and in close cooperation with the relevant ACPM.
It records a particular interest in projects 3 (Confinement and Surveillance Techniques) and 4 (Safeguards System Studies in the Nuclear Fuel Cycle). It emphasizes the importance of cooperation with the IAEA and of the links with the plant operators.
It finally recommends the possible revision of the main lines of the programme after the conclusion of the work of INFCE.

B.1. SOLAR ENERGY

The General Advisory Committee can associate itself with the level of staff proposed by the Director-General, while recommending a certain caution in the deployment of the teams. It approves the contents of the proposal.

B.2. HYDROGEN, ENERGY STORAGE AND TRANSPORT

The General Advisory Committee endorses the recommendation of the relevant ACPM that the maximum of flexibility in the redirection of this programme should be assured by the introduction of reviews of its contents at appropriate intervals. Certain members wish that the actions in connection with the European Test Laboratory should be better defined before their start is considered.

B.3. THERMONUCLEAR FUSION TECHNOLOGY

The General Advisory Committee shares the favourable opinion issued by the Consultative Committee for Fusion (CCF) on the proposal as a whole. The General Advisory Committee associates itself with the concern of certain members, and recommends that the evaluation of hybrid reactors should constitute one particular case only of the conceptual studies.
As regards the preparation of a European Tritium Testing Laboratory, the General Advisory Committee in the majority supports the beginning by the JRC at a minimum efficient level of exploratory studies intended to prepare a decision on the creation of this laboratory at the time of the revision of the five-year (1979-1983) Plasma Physics and Controlled Thermonuclear Fusion programme.

B.4. HIGH TEMPERATURE MATERIALS

The General Advisory Committee notes with satisfaction the harmonious development of the programme and approves the proposal for the new programme. The Committee expresses the wish that a review at a later stage of the possibility of including a large scale test installation should take place. Some members of the Committee further emphasize that the staff proposed constitute a strict minimum and could be increased.

C.1. PROTECTION OF THE ENVIRONMENT

The General Advisory Committee expresses a favourable opinion on this programme.

C.2. REMOTE SENSING FROM SPACE

The Committee approves the remote sensing programme with the following recommendations :

a) the agricultural projects should be closely coordinated with the Directorates-General of Agriculture and Development Aid and with their relevant Committees.
A choice will have to be made between the projects presented which cannot all be carried out simultaneously.

b) the JRC should limit itself to demonstration operations and should not take upon itself the setting up of possible operational systems.

The Committee takes note of the fact that the project "Protection of the Sea" is in conformity with the international obligations undertaken by the Community (in particular the Barcelona Convention).
It records that the activities of the JRC and of the existing aerospace organizations are complementary and do not constitute duplication of work.

D.1. NUCLEAR MEASUREMENTS

The General Advisory Committee expresses a favourable opinion on the proposal ; it endorses the recommendations of the relevant ACPM.
The General Advisory Committee regrets the reduction proposed for ESIS and its attribution to another programme, and recommends that the Director-General should review this proposal.
Because of the interface with other programmes, the Committee insists that the ACPMs concerned should keep each other mutually informed.

E.1. INFORMATICS

The General Advisory Committee expresses a generally favourable opinion on this proposal.

E.2. SUPPORT TO SAFEGUARDS

The General Advisory Committee expresses a favourable opinion on this proposal.
One member considers that he cannot take position on the proposal which he regards as not consisting of research.

E.3. SUPPORT TO THE COMMUNITY BUREAU OF REFERENCE

The majority of the members of the General Advisory Committee note with regret that the proposal consists of a minimal support to the activities of the Community Bureau of Reference. These members emphasize that the JRC could continue to play a significant role in this field and regret the proposed reduction in the level of activities.

E.4. TRAINING AND EDUCATION

E.5. UTILIZATION OF RESEARCH RESULTS

E.6. PROVISION OF SCIENTIFIC AND TECHNICAL SERVICES ON REQUEST

The General Advisory Committee expresses a favourable opinion on these proposals.

F.1. HFR REACTOR

The members concerned of the General Advisory Committee express a favourable opinion on this proposal.

F.2. MOTHBALLING OF ESSOR

Some members of the General Advisory Committee ask that, in the event of the SUPER-SARA project being abandoned, the JRC should consider for ESSOR a solution which is not, in the short term, decommissioning in the sense of the IAEA.

ANNEX III

OPINION OF THE SCIENTIFIC AND TECHNICAL COMMITTEE

ISPRA, 6 MARCH 1979

At its meeting on 5 and 6 March 1979, the Scientific and Technical Committee examined the draft proposal for a 1980-1983 multiannual programme of the Joint Research Centre (document CCG 250) together with the recommendations of the General Advisory Committee. The STC has studied in particular the nuclear parts of this programme under article 7 of the EAEC Treaty.

The STC has taken note with satisfaction of the high degree of international cooperation provided for in the programme.

The STC is concerned by the difficulties resulting from the ageing of the staff and by the obstacles in the way of mobility of the agents.
It recommends the Commission to prepare measures to remedy this situation.

The STC has generally endorsed the recommendations of the General Advisory Committee, but on certain specific points it has formulated the following particular opinions :

A.1. REACTOR SAFETY

The STC shares the very favourable opinion of the GAC on the Reactor Safety programme executed by the JRC and emphasizes its good coherence with the activities carried out at national level.

The STC's discussion was concentrated above all on the SUPER-SARA project, the usefulness of which it recognizes, and a decision for which it considers should be made without delay.

The STC has taken note of the relatively low degree of priority attributed to this programme by the relevant ACPM. On the other hand it has taken into consideration the particular context in which this project is presented and of the possibilities of international cooperation which it offers.

The STC emphasizes that the validity of this programme is connected with its execution as soon as possible. The Committee further draws attention to the scope and complexity of this undertaking, which will require a special effort.

Taking account of all these elements, the Scientific and Technical Committee issues a favourable opinion on the SUPER-SARA project.

As for the project in-pile PAHR, the STC recommends that a feasibility study of an in-pile experiment in this field should be actively pursued. In the event of a favourable result of this study, a decision should be taken quickly to enable the work to begin without delay.

B.2. HYDROGEN, TRANSPORT AND STORAGE OF ENERGY

The Committee expresses its appreciation of the excellent work carried out by the JRC in the production of hydrogen. It notes that according to the conclusions of this work, the route of pure thermochemical reactions is not economic in the foreseeable future.

It also notes the reduction of interest in this route due to the progress, slower than foreseen, in the development of HTR reactors.

Consequently, the Committee approves the decision of the Commission to reduce the scope of the Hydrogen programme and to reapply the effort to the problems of energy storage.

B.3. THERMONUCLEAR FUSION TECHNOLOGY

The Committee insists on the priority to be given to the commissioning and utilization of the cyclotron.

In conclusion the Scientific and Technical Committee expresses a favourable opinion on the draft proposal for a 1980-1983 multiannual programme of the Joint Research Centre.
