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PROPOSAL FOR A REVISION IN THE YEAR 1983 OF THE MULTIANNUAL RESEARCH PROGRAMME (1980-1983) OF THE JOINT RESEARCH CENTRE

(Communication from the Commission to the Council)

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INTRODUCTION

In its communication "Scientific and Technical Research in the European Community : Proposal for the 1980's", the Commission proposed the development of a Communitary R&D strategy founded in particular on a programme framework of Community scientific and technical activities.

It is consequently essential to place within this framework the Joint Research Centre's programme which constitutes a large part of the Communitary effort in this sector.

The Broad lines of this JRC programme reorientation were submitted to the Research Council of 30th June 1982 and must be firmed-up in the next multiannual programme for the 1984-1987 period. Nevertheless, it is opportune to already anticipate the changes, to prepare for them and where possible to launch them.

On the other hand, the JRC is faced with difficulties in carrying out its present programme which imply immediately taking a firm position on the resources assigned to the Super-SARA project for light water reactor safety.

To avoid that on certain projects (mainly Super-SARA) delays accumulate and to ensure on the other hand that the JRC tackles its next programme on a healthly basis, the Commission deems that the year 1983 is the moment where a programme revision must occur.

This programme foresees apart from a reinforcement of Super-SARA, a concentration on the basic options of the future programme framework, especially on those concerning the improvement of energy resource management, aid to developing countries and the promotion of agricultural competition by means of remote sensing from space. These concentrations of effort have as their corollary the slowing down, in some cases termination, of certain activities.

Concerning the Super-SARA project, the Commission has received converging opinions from unrelated independant experts such as the Euratom Scientific and Technical Committee, a Panel of high level experts presided over by Sir John Adams and the American firm of engineering consultants, Stone and Webster.
These opinions confirm the objective interest of the programme, its feasability and the capacity of Ispra to execute it, provided the necessary manpower and financial resources would be available, either directly or by means of collaboration with Member Countries'programmes.

While asking the Member Countries for these supplementary resources, the Commission, aware of their concern not to see increases in the number of European officials, has taken care that the envisaged strategy does not necessarily lead to irreversible increases; it is actively seeking other ways and means of attaining the assigned objectives by having greater recourse to the scientific potential of the Member Countries, following the same idea as that guiding the "Stimulation" proposal.

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The Commission considers, from this fact, not to burden the future R&D strategy with an exagerated concentration on the Super-SARA project (which, whatever the circumstances, would only mobilise 15 % of the JRC staff complement and 5 % of the Community R&D volume). On the contrary, it attaches the greatest importance to all forms of mobility which would allow the JRC to flexibly adapt itself to the evolution in the priorities of its actions and to better integrate them with parallel national actions.

To conclude, the Commission hopes to recall that it has sought in both the Proposal for the 1980-1983 Programme Revision and in the Guidelines for 1984-87, to maintain a balance between nuclear and non-nuclear research.

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1. MOTIVATIONS FOR A REVISION IN THE YEAR 1983 OF THE MULTIANNUAL RESEARCH PROGRAMME (1980-1983) OF THE JOINT RESEARCH CENTRE

1.1. The Joint Research Centre is at present executing the Multiannual Research Programme (1980-1983) which was fixed by the Council on 13 March 1980 (O.J. 72/11).

In accordance with the "Sliding Programme" principle, the Commission should, in 1982, submit a new proposal for a multiannual programme, repealing the last year of the programme under execution and substituting it by the first year of a new programme.

1.2. The Commission, on the contrary, proposes to execute the last year of the 1980-1983 programme, suitably revised and to submit in good time, a new draft programme for the period 1984-1987.

In this, the Commission follows the recommendation formulated by the Council in May 1981 (1) and proposes to profit from the year 1983 on the one hand to reestablish resources at a level appropriate to the execution of certain projects and on the other for anticipating the reorientation of other projects.

If the year 1983 represents in effect a natural step in linking together JRC programmes (the overlap of two successive plans should in principle occur during the year), the Commission has nevertheless two reasons to approach the Council with special proposals.

The first is that it hopes, on this occasion to begin to turn the path of the JRC towards its own specific mission within the Community's new R&D strategy (2).

The second reason is that the execution of the present research programme calls for a redimensioning of the effort, the concentration of the available means on the particularly exacting activities (especially Super-SARA) and the recourse to vital forces from the outside.

The Commission therefore proposes a revision of the programme for 1983.

1.3. At the 30 June 1982 meeting, the Council examined the document "New Guidelines" for the 1984-87 JRC programme and took note of the four-fold intention of the Commission :

1. to insert the JRC programme into the Programme Framework;

2. to propose, in this connection, an increased effort on the Super-SARA project, on the basis of the conclusions of experts consulted by the Commission;

3. to prepare proposals on the future of the HFR reactor with a view to a decison on the occasion of the decision of the JRC programme;

4. to examine in this context, the mobility problem.

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(1) see document ATO 46 (81)

(2) Scientific and Technical Research in the European Community : proposals for the 80's - COM (81) 574.

1.4. It is proposed to firm up these intentions by the following approach :

a) beginning November 1982, the Council will be called to take a position (1) on the "New Guidelines" (2) assigned to JRC research for the period 1984-1987,
b) simultaneously, the Council will decide (1) in consequence, on a revision, for 1983, of the 1980-1983 programme which takes into account the measures which would be able, from 1982, to be put in hand by means of the 1982 amending budget (3),
c) end November 1982, Communication of the Commission to the Council regarding the "Programme Framework",
d) in February 1983, the Council takes a position on the "Programme Framework".
e) in June 1983, Council decisions on the JRC Multiannual programme for the period 1984-1987 and on certain associated measures (mobility etc...)

1.5. Comments

1.5.1. A favourable Council decision on the present revision proposal would allow the JRC, from the end of 1982 :

- to redeploy existing staff and a certain number of newly aquired competences, on the Super SARA, Lobi and Pahr nuclear projects, judged to be of first priority by the Council of May 1981, and to accelerate their execution;
- to reenforce certain other activities that the Commission regards as particularly important in the light of the new global R&D strategy for the Community, notably in the domain of Common Agricultural Policy (Remote Sensing from Space), Aid for Development (Training Institute for Developing Countries) and Teleinformatics;
- to combat, by the compression or suppression of other activities and the putting in hand of appropriate measures for mobility, the tendency towards growth of the overall staff level which would logically follow the increase of effort on nuclear projects and other activities shown above;
- to reestablish, where neccessary, the level of resources required for the rational operation of general services and of scientific and technical support, in particular, Ispra safety services, both classical and nuclear.
- to prepare new proposals for the future of the HFR reactor;

at the same time, to put the JRC in the best possible condition to meet the requirements of the "New Guidelines" of its 1984-1987 multiannual programme, proposed to the Council in May 1982, and in conformity with the "Programme Framework" under preparation.

1.5.2. The year 1983 appears therefore, to the current programme as a year in which to set in order the balance between actions and resources and in respect of the future programme, as a year of transition and of preparation. Concerning budgetary planning and internal organization, a certain number of measures have already been projected in 1982 without implications for the programme.

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(1) See statement of the Council President's Conclusions in Annex 1
(2) See document "New Guidelines" ATO 46/82
(3) See draft amending and supplementary budget N°1-1982

For 1983, the redeployments envisaged go beyond a simple budgetary adjustment and call for the adoption of a definite position by the Council.
For this purpose, the Commission submits to the Council the following Revision Proposal which extends the modifications begun in 1982 which it supposes will have been approved in the meantime (or will be approved simultaneously). We note that the Council itself, on the 30 June 1982 sitting, decided to tie the calendar for the 1983 programme revision to that of the second reading of the 1982 amending budget.

1.5.3. The Commission accompanies these proposals for setting up the programme by a series of organizational measures staggered in time and concerning :

a) the piecemeal approach to the new global strategy and an optimal resource utilization, rendered easier by the recent fusion between the GD XII and the JRC,

b) the organization of the JRC General Directorate and that of the Ispra Establishment, resulting in a redistribution of the Scientific Divisions between Departments and the appointment of a new Director responsible for the project Super SARA,

c) the replacement of the General Advisory Committee by a Governing Board,

d) the reexamination of the various factors influencing staff mobility, the latter being an essential condition for realising the proposed changes.

2. NATURE OF THE PROGRAMME REVISION ENVISAGED FOR 1983

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2.1. Position of the JRC programme within the programme framework

In its communication "Scientific and Technical Research and the European Communities : proposals for the 1980's", the Commission proposed the development of a genuine communitary strategy for R & D especially founded on a Programme Framework of Community scientific and technical activities. In June 1982 the Commission presented a first outline of the 1984-1987 Programme Framework (2), the Programme Framework to be submitted in its complete form to this Council before the end of the year 1982; seven basic options have been used for the preparation of the Programme Framework :

- promotion of agricultural competitiveness
- promotion of industrial competitiveness
- improvement of raw materials management
- improvement of the management of energy resources and the reduction of Community energy dependance on external sources
- reenforcement of aid to developing countries
- improvement of living and working conditions (safety, health, environment)
- improvement of the efficiency of scientific and technical potential in the Community

These basic options imply a certain number of scientific and technical objectives within which all the Community's activities to be retained in future must be written.

The contributions which the JRC could bring to the realization of the basic options kept by the Council on 8 March 1982 cover two topics in particular :

a) improvement of the management of energy resources with three headings
   - Fission (nuclear safety)
   - Fusion
   - New energy sources and energy economy

b) reenforcement of aid to developing countries.
   Beyond that, JRC activities could bring a contribution to other basic options such as the promotion of agricultural competitiveness (Remote Sensing from Space programme), the improvement of living and working conditions (Environment, Safety), promotion of industrial competitiveness (High Temperature Materials, Nuclear Measurements, Support to the Community Reference Bureau, data banks, informatics).

   Taking into account the urgency of problems relating to light water reactor safety and the special competences of the JRC, the Commission proposed an increased effort on the Super Sara Project, without neglecting the other actions mentioned above. At the same time, the Commission proposes measures to cleanse and to put in order the general services of the JRC.

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(1) COM (81) 574 final of 12th October 1981
(2) SEC (82) 896 final of 3rd June 1982

Other than these specific reorientations falling under the general approach of putting in hand the R & D strategy for the 1980's, it should be noted that the JRC programme foresees the pursuit of activities in the environment sector at a significant level. These activities as well as the components of other sectorial activities - for example in new energies and nuclear safety - constitue a response to the option "Improvement to Living and Working Conditions (safety, health, environment)" and reenforce the JRC vocation to devote an important part of its activities to safety related problems.

2.2. Structure of the Present Programme

The Joint Research Centre's 1980-1983 programme comprises a nuclear part approved by the Council under Article 7 of the EAEC Treaty and a non-nuclear position approved by the Council under Article 235 of the EEC Treaty.

The nuclear activity comprises the following topics :

- Nuclear safety and fuel cycle
- Nuclear measurements
- Exploitation of large installations
- Thermonuclear fusion and technology and High temperature materials (New energies)
- One part of "Specific Support" to the Activities of the Commission.

The non-nuclear activity comprises the following topics :

- Study and protection of the environment
- Solar energy, hydrogen production, energy storage and transport (New energies)
- The other part of "Specific Support" to the activities of the Commission.

1110 research staff are assigned to JRC programmes.
Assigned to general services and scientific and technical support is a staff of 1150.
The total JRC staff complement is 2260 employees.

2.3. Evaluation of the current JRC programme

a) Nuclear safety research (safety of light water and fast breeder reactors as well as the fuel cycle in its entirety, from actinides to the disposal of wastes, passing by way of nuclear "Safeguards"(1) and nuclear measurements) occupies more than half of the JRC staff. Here it represents a notable contribution when comparing communitary research with the total of that performed in all the Member States.

In several of the objectives depending from this part of the programme, the JRC has aquired a recognized central function and is seen to undertake a certain number of coordination actions, often resulting in the only communitary framework (evaluation of the system for concentration and incineration of actinides, animation of the campaigns for the intercomparison of defects in thick walls of reactors, international cooperation for the development of safeguards techniques, statistical analysis of operational incidents and faults in reactors, etc...).

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(1) Techniques for setting up the "Control of Fissile Materials"

Amongst other things, this programme includes three important projects, Lobi, Pahr and Super SARA which technically compare favourably with the most advanced experiments in the Member Countries and the U.S.A. in this sector.

The research orientation and the quality of the work is satisfactory; however the Commission cannot ignore two criticisms which are sometimes aimed at Communitary Research, and concern firstly its costs and secondly its relative slowness. In reply to these considerations, the Commission has taken a certain number of organizational measures and identified one of the essential reasons for these delays as the level of resources available.

After a profound analysis, corroborated by external consultants,(1) the Commission arrived at the conclusion that there exists at present a marked unbalance between the resources needed to execute certain projects, particularly Super SARA, and the tasks assigned to the JRC in terms of objectives and delays.

This situation calls for rapid corrective measures to avoid the multiplication of delays and in consequence, the degradation of JRC's reputation. Rather than requesting supplementary resources, the Commission proposes in the document "New Guidelines" and for the immediate future in the present paper, a collection of measures which rely on :

a) a reenforcement of certain priority objectives, in particular Super SARA, as well as the scientific and technical support conditional to its execution,

b) the slowing-down of other objectives (and for a small number, a termination) in domains where it is possible by means of compression, to make available competences required by priority projects,

c) other measures aimed at accelerating mobility which will later replace the emergency measures mentioned above,

d) speeding up the redeployments envisaged by the addition of new forces from outside, by recruitement and by service contracts.

b) The other activities of the JRC (new energies, study and protection of the environment, nuclear measurements, specific support to the activities of the Commission and exploitation of large installations) can be to a large extent considered satisfactory.
The rapid increase in non-nuclear activities begun 10 years ago on a very modest scale (with the scepticism of certain Member Countries) (2) is a clear illustration of the good results obtained by the JRC; at present, these activities employ about 40 % of the staff. This figure is also an indication of the internal mobility achieved.

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(1) Adams Panel, Stone and Webster consultation

(2) The fact that the first year (1972) of the "diversification" had to be carried out under contract between the Commission and the Member States and not by programme decision illustrates this doubt and gives a measure of the obstacles overcome.

In several fields, the CCR has been able to climb to a good position in international cooperation at times as leader, particularly in the production of hydrogen by the thermo-chemical route (first closed circuit), in techniques for testing solar systems and materials (ESTI), remote sensing from space, advanced data bank systems (ECDIN), communications (EURONET test and reference centre SCRIBA), experiments on the impact of pollution on a regional scale (ILE), representing the Community in the international fusion reactor project (INTOR) and the work of the Community group on the next European torus (NET) etc...

There too is revealed an unbalance between assigned objectives and allowed recources. No very serious pressures exist, contrary is the case with the Super SARA nuclear project, but it is certain and probably a cause of regret, that the JRC lacks the means to give these different projects all the dynamism wanted.

Taking into account the general situation of austerity, the Commission does not envisage reenforcing the whole of these activities but concentrating a selective effort on those which directly contribute to the Priority Options of the R&D global strategy, and specifically to the promotion of agricultural competition (remote sensing from space), to the development of telecommunications and office technology (SCRIBA project, Reference and Test Centre), to the development of reference substances and methods (BCR support), to the cooperation with developing countries (training).

Here again, the Commission does not propose a simple reenforcement, but, with the aim of compressing additional requests proposes a group of measures including :

a) to reenforce the objectives described above;
b) to slow down (or progressively abandon) other activities;
c) favourising mobility and by these means the qualitatively and quantitatively scientific value of certain teams.

2.4. Main lines of the proposed modifications

2.4.1. Urgent modifications essentially concerning the execution of the activities of the theme "Nuclear Safety and the Fuel Cycle".

These nuclear activities for about half of the personnel of the JRC and include a certain number of projects in which the JRC plays a central role in the assement of nuclear safety. These projects require important staffing. Specially the projects Super-SARA, Lobi and Pahr which the Council in May 1981 considered as having priority, are being slowed down due to a shortage of staff [1].

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(1) The nature and causes of this staff shortage are presented in Annex 8.

For the Super-SARA Project, the Commission has obtained opinions from various independant experts such as the Euratom Scientific and Technical Committee, a high level panel of science managers chaired by Sir John Adams and the American firm of engineering consultants, Stone and Webster. Their advice confirmed the interest in the programme's target, its feasability and the Ispra Establishment's capacity to successfully pursue it, given the required manpower and financial resources - significantly larger than those foreseen in 1981 - which would either have to be found directly or by the collaboration with Member Countries' programmes. The programmes complementary nature with respect to similar national projects (Community and USA) was confirmed and reinforced (see annex 6).

The technical interest of these projects for industry and safety agencies is all the more important if the duration of the tests is limited and the time-table respected. The lack of staff does not allow us to operate as fast as would be wished, and in the worst case, to obtain the necessary authorizations to undertake the most severe tests.
Moreover, extension of the time schedule will involve an important increase in the total cost of the project. The Commission considers it urgent to anticipate in 1982 and 1983 a number of measures for rearrangement outlined in the document "New Guidelines" for the period 1984-1987, notably :

- redeployment of staff having competences in the nuclear field to the project Super-SARA, Lobi, Pahr in such a way to guarantee the success of these experiments and keep to a reasonable time-table;
- rearrangement of other activities of the programme "Reactor Safety", slowing down or stopping a number of these activities in order to free staff and concentrate them on priority projects as well as on a small number of significantly important and coherent activities;
- reinforcement of the general and S/T support services which condition the regular execution of research in the various scientific divisions (1).

2.4.2. Other modifications preparing the new guidelines for the JRC

The contributions that the JRC can bring to the successful carrying out of the fundamental options retained by the Council on 8 March 1982 cover principly two themes :

- improvement of energy resources (fission, fusion, new energies and energy conservation);
- reinforcement of aid to developing countries.

Further, the activities of the JRC could make a contribution to other fundamental options such as the promotion of agricultural competitiveness (remote sensing), improvement in the conditions of living and work (environment, safety), promotion of industrial competitiveness (materials for high temperatures, nuclear measurements, support for the Community Bureau of References, data banks, informatics/telematics).

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(1) The nature and causes of this staff shortage are presented in Annex 8.

a) The programme of nuclear safety, recast as proposed in chapter 3.4. above, will constitute a major ocntribution (more than 1000 persons) to the reduction of the inconveniences associated with this form of energy.

b) In the area of new energies (fusion), a slight reinforcement (5 persons) of the conceptual study group will allow the JRC, in collaboration with the Centre of Garching, European lead member for these studies, to make an essential contribution to the work of the Community Group NET; during the plan 1980-1983, the JRC has already been able to start an important programme on materials, to put into operation (within the proposed time table) a cyclotron for irradiation tests and to actively participate in the representation of the Community in the international project INTOR. All the activities of the JRC in relation to fusion are harmonized within the Community Programme on Fusion.
Within the area of new energies and energy conservation the termination of the programme hydrogen will allow an increase in effort on :
. Solar energy with emphasis on test techniques and, in particular, on the life-time and reliability of the components and systems. The JRC holds a central position and is willing to assemble the efforts of the national laboratories. The central testing facility, ESTI, constitutes a unique installation in Europe, and a meeting place for the specialists of the sector and committees in charge of the development of reference techniques.
. The national use of energy with emphasis on energy transport and storage (fundamental problems for the rational management of energy which is produced discontinuously and in excess during daylight hours) and energy audit in dwellings and in small and medium industries (various operations related to "Energy Bus", i.e. mobile energy monitoring units, associated with data banks and information services). These activities could be continued through specific actions in favour of the analysis and diffusion of the results of the Demonstration Programmes and by taking a leading role in the corresponding projects of the International Energy Agency (the candidature of JRC to IEA has been proposed by the Commission).

c) Regarding assistance to the Developing Countries, on the basis of experience acquired by JRC in support of the projects of European Development Funds, of the Energy Cooperation and the Mediterranian Agreements (contribution by JRC of 30 expert missions and organization of a seminar on the Energy Planning for the Developing Countries), the JRC proposes to structure its action and to make it more perceptable by developing an ad-hoc institute for training, education and studies (see Annex 7) which is open to scholarshipholders of the above agreements and decision making people from different associated countries. The Institute will serve as a promotional place and as a centre of actions common to different national organisations (i.e. international) active in the sector. The themes chosen (energy planning & new energies and management of resources & remote sensing) correspond to the strong points of JRC research (15 more people including 8 research men).

d) Improvement of the competitivity of European agriculture requires diverse structural actions and, in particular, better planning of the utilisation of land (reduction of regional differences and elimination of structural excesses, etc.).

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The results obtained by the JRC in the field of applications of remote sensing in agriculture (there again, the JRC projects have a considerable promotional effect on the large number of national laboratories associated in different campaigns organized by the JRC) call for an increase of the effort, which in 1983, will involve the renewal, at constant cost and staff level, of 20 % of the people presently assigned to the programme, and will make it possible to launch a campaign for soil evaluation in the framework of the Common Agricultural Policy.

e) Informatics is one of the strategic technologies to the development of which the Community should pay extreme attention (communication, bureautics, robotics). The JRC, on the basis of experience acquired in support of the development of EURONET and of the data bases EURONET/DIANE as well as its own projects of internal network and bureautics (SCRIBA), will rearrange its services in order to transfer to private operators the data bases which are reaching the operational stage, and will concentrate its efforts on research in the areas of rapid evolution. While the net result of the staff movement in 1983 is an apparent reduction, the real objective is to double during 1984-1985 the number of researchers in this sector to give an increased support to the Commission's projects (in particular INSIS).

On the whole, these measures initiate a progressive predefinition of the role of the JRC, as a promoting centre of European projects, in which the JRC, in addition to its own research contributions, will assume the function of conception, assembling, promotion and synthesis.

2.4.3. General and S/T support services

These services (computer centre, workshop, reactors, high activity laboratories, security and infrastructure services, etc.) are vital for the advancement of research in the scientific divisions.
As providers of services, their resources come from the charges levied for their assistance, either from the projects or from the organisation as a whole.
Their subordinate position has worked against these units whose staff has fallen off both in number and in quality, and whose budgetary allocations have gradually been diminished in real terms by inflation, inadequately compensated for by a too low inflation coefficient (6 % per annum).
The emergency measures proposed for 1983 concern the priority reconstitution of the normal and nuclear security services (vital for the JRC in general and in particular for the execution of the Super-Sara project, particularly because they are one of the conditions required by the Italian Safety Authorities to issue the operationg licence for the ESSOR reactor necessary for the programme to continue), the reestablishment of an infrastructure budget at a fair value and a start to the rebuilding of the S/T support services(1).

2.5. Consequences of the modifications to the programme 1980-1983

The various measures proposed concerning staff allocation are given in the following sections. The increase of the total staff would be from 2,260 to 2,314 people (2,4 % more), the research staff increasing from 1,110 to 1,122 research men (1 % more).
The measures proposed in terms of budget are given in Annex 5. These measures can be summarized as follows :

- The total cost of the 1980-1983 programme increases, as a consequence of the budgetary adjustment for 1982 and of the programme revision for 1983, from 578.084 to 615.185 MioECU, corresponding to an increase of 37.1 MioECU (or 6.4 %).

(1) The list of these reinforcements is given in Table 4 and in the budgetary annexes

an increase of 21.337 MioECU is due to the budgetary adjustment and an increase of 15.764 MioECU is due to the programme revision.

The partitioning of these measures on 1982 and 1983 have obviously been aimed to lighten the budget 1983.

2.5.1. Modifications to the programme activities

a) Reactor Safety

The modifications proposed in the staff utilization for 1983 are summarized in Table 1, at the end of this chapter. Technical content and partitioning of resources by project for the year 1983 are reported in Annex 3 - A.1., Reactor Safety Programme.
The reinforcement of the Super-Sara project is achieved partly by an overall staff increase of the Reactor Safety Programme (from 308 to 326 research men) and partly by a redeployment of staff previously assigned to safety studies on fast breeder reactors and radioactive wastes. The reinforcement of LOBI is achieved by the extension of the contract covering the contribution of 11 persons supplied by the BMFT, the reduction of under-staffing and the concentration of activities rendered possible by the commissioning of the loop. The staff allocated to this project (58 research men plus 11 under contract) remains nevertheless below that authorised for the programme.
As a consequence the staff allocated to LWR studies increases from 186 to 228 research men and the staff allocated to FBR studies decreases from 122 o 98 research men.
The most important modifications in the FBR studies are the following :

- Discontinuation of the projects
  - fast breeder hypothetical accident code
  - fast breeder fuel sub-assembly thermohydraulics
- Reinforcement of the PAHR project
- Inclusion of the activity on fuel-coolant interaction in the PAHR project
- Start of a new study on phenomena related to energy release (multifluid multiphase phenomena)
- The activities of the project on "Study of behaviour of structures and containments" will be partly concluded (COVA and COVAS programmes) and partly (research on materials dynamic behaviour) will be included in the new project "Materials properties and structural behaviour".
  The Commission will try to adapt its cost shared programme in order to account for these reductions.
  The Commission already gives special attention to the integration of these activities with those of the same nature performed in the member states; contacts have been made, to this effect, with the ministries concerned.

b) Plutonium fuels and actinide research

A reduction of the staff from 117 to 112 research men is proposed, corresponding to the discontinuation of the contribution by the Ispra Establishment to this programme, which constitutes the main part of the activities at Karlsruhe. In addition, it is being considered to what extent certain competences of this Institute could be used for other JRC research activities; this will be taken into account in the programme proposal 1984-1987.

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c) Safety of nuclear materials

The modifications proposed in the staff utilization for 1983 are summarized in Table 2 at the end of this chapter. Technical content and partitioning of resources by project for the year 1983 are reported in Annex 3 - A.3. Safety of Nuclear Materials Programme. The necessity of reinforcing the Super-Sara project with chemical and radiochemical engineering experts, who are found in limited amount at Ispra, imposes the continuation of the activities on optimization of alpha waste management and in particular the experimental activity on chemical separation of actinides from waste (Project Actinide Separation). Thus the staff assigned to the programme is reduced from 52 to 42 research men.
The programme is now essentially directed towards the safety assessment of radioactive waste disposal in continental geological formations and into the seabed.

The Commission is examining to what extent certain activities reduced or discontinued by Ispra may be taken up by other Establishments of the JRC or by national research centres.
The conclusions of these reflections will be included in the programme proposal 1984-1987.

d) Fusion technology

This programme harmonized with the Community Fusion Programme is divided into two groups of activities : research on materials (including, especially, the behaviour of materials under irradiation) and conceptual studies for future reactors. Research on materials is successfully progressing and the new cyclotron has entered into operational service; the reinforcement envisaged (5 research men) concerns the group of conceptual studies which will give an essential contribution to the Community group NET (Next European Torus). Because of this the staff increases from 60 to 65 research men.

e) New energies

The future evolution (1984-1987) of the programme "new energies" of the JRC is the subject of an analysis in common with the preparation of the 3rd programme of the Shared-Cost Action "Energy". In 1983 The following orientations may be implemented :

- reinforcement of central test laboratory for solar energy (ESTI);
- progressive evolution of the activity "solar energy for dwellings" towards the more general aria of the rational use of energy in dwellings and the development of techniques of energy audit; it has to be noted that the JRC ahs been invited by the International Energy Agency to present its candidature, on behalf of the Commission, as Lead Agency for the project Energy Audit;
- progressive evolution of the programme "hydrogen production, energy storage and transport", towards the more general area of the rational use of energy.

These evolutions are carried out at constant level of staff and do not require in 1983 a revision of the Council Decision; a more important readjustment will take place in the framework of the new programme 1984-1987. The revision of the Hydrogen programme was already planned at the moment of the approval of the 1980-1983 programme.

f) Protection of the environment

The evolution of the activities is carried out gradually in agreement with the relevant ACPM; the staff levels remain constant and no formal revision of the programme is required.

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g) Remote sensing

The task assigned by the Commission to the JRC is the rapid development of remote sensing techniques to be made available to the "final users" in the framework of the Common Agricultural Policy. A specially important field of application is the analysis of land use and land potential.
The resources allocated to this programme are qualitatively reinforced (not quantitatively because the authorized staff remains constant) by means of priority assignment of 11 posts which are made free in other areas of the JRC activity; this will allow the acquisition of specialists in particular fields.
These modifications do not require a revision of the Council Decision and are in the directions recommended by the group of experts nominated by the governments.

h) Specific support to the Commission"s sectoral activities

On the whole this programme will increase in research staff from 91 to 95 research men, but this variation effects in a different way the different activities of the programme.
The support to Developing Countries and, specifically, the development of the training courses for technicians, graduates, teachers and policy makers, is reinforced, with the set up of an Institute for Training and Scientific Cooperation to which the JRC will supply the infrastructure with 15 people (of which 8 are research men), the teachers essentially furnished by national and international organizations under contract.
It is proposed to increase the support given to the Community Bureau of Reference (CBR) by the setting up at the Geel Establishment of a service for the production, storage and distribution of reference materials (increase of 4 research men). The reference materials concerned are non-nuclear materials (impurities in non-ferrous materials and trace elements in organic materials) which need a very specific conditioning to ensure the stability of the samples with time. This activity demands the construction of a special building (0,5 MioECU) with the related equipment and an increase of personnel of 4 research men.
Informatics and, more specifically the activities concerning telematics, are also reinforced following the general trend of the Commission activities in this field; the JRC research actually constitutes a support to these activities, in particular to projects such as INSIS, EURONET/DIANE and, hopefully, ESPRIT. The studies are centered on the design and test of prototype advanced networks, starting from the commercially available materials, and on the technical aspects of the standardization problems.
These increases are in part counterbalanced by a decrease of other service activities, but a complete compensation could not be reached, considering the high - and increasing - demand of the JRC contribution in support of the other Commission services (Safeguards, Customs Union, Environment and Consumer Protection, Energy, Industry, Transport, etc.).
Only the ACPM Informatics is concerned directly by these measures; however, as the envisaged evolution is gradual, the discussion on the new objectives will be included in the process of the preparation of the programme 1984-1987.
In the 1980-1983 programme the JRC has shown an increased interest for the utilization of the results of its research by setting up of a programme "Utilization of research results". Experience has shown that the opportunity for exploitation in general becomes apparent when the original project - in some cases the original programme - has been terminated for several years.
The proposed increase of research staff from 1 to 5 is a simple recognition of a real situation : such a rise would provide explicit support to innovative people and laboratories.
The terms of reference of the programme do not change.

.../...

The proposed modifications in the utilization of the personnel for 1983 are summarized in Table 3, at the end of this section

2.5.2. Reinforcement of the general and S/T support services

The objectives of the reinforcement of these services, as mentioned above, are the following :

- to restore to a sufficient level of effectiveness the security services of the Ispra Establishment (site monitoring and meteorology, health physics, conventional safety);
- to increase the potential of scientific support services in order to cope with the increasing demands on the scientific divisions and programme activities; this increase concerns the central workshop, the computer centre, the electronic service, the medium and high activity laboratories.

These reinforcements would be implemented gradually over 4 years (1982-1985). The reinforcements that are required are shown in Table 4 at the end of this section; the table includes the measures already planned in 1982 under the budgetary revision.

2.5.3. Particular case of the HFR reactor

In agreement with point 3 of the Conclusions by the President of the Council (session of June 30, 1982), the Commission will prepare proposals concerning the future of the HFR reactor, which will be an integral part of the proposal for the multiannual programme 1984-1987 and will thus be announced in November 1982.
In 1983 the operation of the reactor will be continued with the same staff level and the financial conditions initially foreseen in the authorization of the programme 1980-1983. However, a particular effort will be devoted to promote the utilization of HFR by the different research programmes of the Community and by potential users outside the Community.

2.6. Mobility measures

To redeploy staff in line with the objectives and priorities put forward in this document and later in accordance with the 1984-1987 programme proposal (general lines appear in the "New Guidelines" document, it will be necessary to call upon internal and external mobility - 15 to 20 % of the staff during the period under consideration).
From the requirements identified it is clear that existing mechanismes would be inadequate to assure the renewal and adaptation of corresponding staff competences in the delay envisaged.
Ageing of staff in research establishments (JRC is no exeption) and rapid evolution of R & D priorities thus demand other measures.
The quickest and most direct way to begin the process would be to call on outside staff. The Commission is aware of the reservations of Member Countries toward the creation of permanent positions : the proposed method is therefore based on the provision of room to manpower by repayable posts.
The Commission is busy examining various means which would provide for the aquisition of additional staff by detachment of specialists from national centres or by service contract (limiting or avoiding recruitment of permanent staff), as well as other measures to increase staff mobility (see annex 8).

TABLE 1.- Staff (research men) assigned to the different projects of the Reactor Safety Programme before and after revision

PROJECT	Programme 1980-1983	Proposed revision 1983
Light water reactors (LWR)		
. Super-SARA	75	122
. LOBI	68	58
. Reliability and risk evaluation	24	26
. LWR primary circuit integrity	19	22
Total LWR	186	228
Fast-breeder reactors (FBR)		
. Fast-breeder hypothetical accident code	8	0
. Fast-breeder fuel sub-assembly thermohydraulics	20	0
. Fuel-coolant interaction under accident conditions	4	0
. Phenomena related to energy release	0	10
. Post accident heat removal (PAHR) - In-Pile	8	19
- Out-of -Pile	39	39
. Material properties and structural behaviour	20	30
. Study of the behaviour of structures and containments	23	0
Total FBR	122	98
Grand TOTAL	308	326

TABLE 2.- Staff (research men) assigned to the different projects of the Programme Safety of Nuclear Materials before and after revision

PROJECT	Programme 1980-1983	Proposed Revision 1983
Risk evaluation Protective barriers	26	36
Actinide separation	15	0
Actinide monitoring	11	6
TOTAL	52	42

TABLE 3.- Personnel (Resaerch staff) of programmes before and after revision (Summary)

Programmes	1980-83 Programme	1983 Revision
A. NUCLEAR SAFETY AND THE FUEL CYCLE		
1. Reactor safety	308	326
2. Plutonium fuels and actinide research	117	112
3. Safety of nuclear matrials	52	42
4. Fissile materials control and management	55	55
Total	532	535
B. NEW ENERGIES		
1. Solar energy	60	60
2. Hydrogen production, energy storage and transport	40	40
3. Thermonuclear fusion technology	60	65
4. High-temperature materials	38	38
Total	198	203
C. STUDY AND PROTECTION OF THE ENVIRONMENT		
1. Protection of the environment	90	90
2. Remote sensing from space	50	50
Total	140	140
D. NUCLEAR MEASUREMENT	108	108
E. SPECIFIC SUPPORT TO THE COMMISSION		
1. Informatics	34	25
2. Support to safeguards	13	13
3. Support to the Community Bureau of References	7	11
4. Training and education	9	6
5. Utilization of research results	1	5
6. Provision of scientific and technical services	27	35
Total	91	95
SUB-TOTAL		
F. OPERATION OF LARGE SCALE INSTALLATIONS		
1. Operation of the HFR reactor	41	41
GRAND TOTAL	1.110	1.122

25

TABLE 4 - REINFORCEMENT OF GENERAL SERVICES AND OF S/T SUPPORTS OF ISPRA ESTABLISHMENT IN 1982 AND 1983

Operation of ESSOR reactor	8
Site monitoring and meteorology	10
Health physics	9
Decontamination	3
Radioactive waste treatement	4
Fire service	3
General services	15
Computer service	4
Central workshop	10
Medium Activity Lab (LMA)	7
TOTAL	80

3. PROPOSAL FOR A COUNCIL DECISION

PROPOSAL FOR A COUNCIL DECISION

adopting a modification for the year 1983 in the research programme to be implemented by the Joint Research Centre for the European Atomic Energy Community and for the European Economic Community (1980 to 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 (1) presented after consultation, with regard to nuclear projects, of the Scientific and Technical Committee,

Having regard to the opinion of the European Parliament (2),

Having regard to the opinion of the Economic and Social Committee (3),

Whereas, 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;

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

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

Whereas on 14 January 1974 the Council adopted a resolution concerning the coordination of national policies and the definition of Community actions in the field of science and technology (4);

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 (5);

Whereas Article 3 of Decision 80/317/EEC, Euratom provides for a review of the programme during its third year (6);

(1)
(2)
(3)

(4) OJ No. C 7, 29.1.1974, p. 2.
(5) OJ No. L 16, 20.1.1971, p. 13.
(6) OJ No. L 72, 18.3.1980, p. 11.

HAS DECIDED AS FOLLOWS :

Article 1

The research programme 1980-1983, as presented in Annexes A, B and C of the decision 80/317/EEC, Euratom, is annuled and replaced, for the year 1983, by a revised programme, as presented in the Annexe of the present decision.

Article 2

The expenditure commitments forecast to implement the programme defined in the Annexe and the maximum number of staff are estimated at 615.18 million European currency units and 2.314 respectively. The indicative breakdown of funds and staff is given in Annex.

The European unit of account shall be that defined in Article 10 of the Council Decision of 16 December 1980 (1), amending the Financial Regulation of 21 December 1977 (2) concerning the utilization of the ECU for the general budget of the European Community.

Article 3

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 of the European Economic Community (3).

Article 4

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

Article 5

The residual ammounts from the 1980-1982 programme years may be used for the execution of the 1983 programmes.

Done at Brussels,

For the Council

The President

(1) OJ No. L 345, 20.12.1980, p. 23
(2) OJ No. L 356, 31.12.1980, p. 1
(3) OJ No. L 255, 20.09.1974, p. 1

ANNEX

1. RESEARCH PROGRAMME FOR THE YEAR 1983

(last year of the quadriannual programme 1980 - 1983 revised by the present decision)

The following modifications are introduced in the programme adopted with the Decision 80/317/EEC, Euratom of 13 March 1980

A. NUCLEAR SAFETY AND THE FUEL CYCLE (Joint Programme)

A.1 Reactor Safety (nuclear activity)

The programme consists of the following 7 projects:

- project Super-Sara: in-pile testing of LWR fuel under accident conditions;
- project LOBI: out-of-pile integral system for LOCA studies;
- reliability and risk evaluation: European Reliability Data System (ERDS) and LWR accident sequence analysis;
- project LWR primary circuit integrity: early detection of fault and primary circuit components life prediction;
- study of phenomena related to energy release: multiphase multifluid thermohydraulics;
- project PAHR: in-pile and out-of-pile study of residual heat removal in case of LMFBR core melting;
- study of material properties and structural behaviour:prediction of reactor material behaviour in normal operating and accident conditions.

A.3 Safety of Nuclear Materials (nuclear activity)

The programme consists of the following three projects:

- risk evaluation: risk evaluation for the geological disposal of radioactive waste;
- protective barriers: study of the barriers interposed between waste and man in the case of geological disposal;
- actinide monitoring: plutonium determination in radioactive waste.

E. SPECIFIC SUPPORT FOR THE COMMISSION'S SECTORAL ACTIVITIES (Joint Programme)

E.6 Provision of Scientific and Technical Services (nuclear and non-nuclear activity)

Reinforcement of the activities in support of Developing Countries in particular with the creation of a Training Institute.

The other programmes are not modified. The new level of resources for the various programmes is reported on the following pages.

2. INDICATIVE BREAKDOWN OF STAFF FOR 1983 AND OF FUNDS FOR 1980 - 1983

	Expenditure commitments (Mio ECU)					
	Approved programme[1]	1982[2]	1983[3]	Total	Total staff	of which research staff
A. NUCLEAR SAFETY AND THE FUEL CYCLE						
1. Reactor safety	176.043	19.002	11.553	206.598	773	326
2. Plutonium fuels and actinide research	61.379	0.025	- 0.212	61.192	196	112
3. Safety of nuclear materials	23.390	0.246	- 0.683	22.953	93	42
4. Fissile materials control and management	23.225	0.246	- 0.051	23.420	117	55
Total	284.038	19.519	10.607	314.164	1179	535
B. NEW ENERGIES						
1. Solar energy	25.928	0.300	0.258	26.486	121	60
2. Hydrogen production, energy storage and transport	16.582	0.194	0.688	17.464	81	40
3. Thermonuclear fusion technology	29.752	0.291	0.992	31.035	139	65
4. High-temperature materials	17.257	0.005	0.142	17.404	64	38
Total	89.519	0.790	2.080	92.389	405	203
C. STUDY AND PROTECTION OF THE ENVIRONMENT						
1. Protection of the environment	38.948	0.402	0.348	39.698	174	90
2. Remote sensing from space	20.000	0.244	0.205	20.449	98	50
Total	58.948	0.646	0.553	60.147	272	140
D. NUCLEAR MEASUREMENTS	49.738	–	0.763	50.501	180	108
E. SPECIFIC SUPPORT TO THE COMMISSION						
1. Informatics	14.726	0.169	- 0.270	14.625	51	25
2. Support to safeguards	6.350	0.019	0.049	6.418	23	13
3. Support to the Community Bureau of References	3.467	0.019	0.025	3.511	18	11
4. Training and education	3.535	0.044	0.036	3.615	11	6
5. Utilization of research results	1.859	0.005	0.431	2.295	14	5
6. Provision of scientific and technical services	10.598	0.126	1.453	12.177	76	35
Total	40.535	0.382	1.724	42.641	193	95
SUB-TOTAL	522.778	21.337	15.727	559.842		
F. OPERATION OF LARGE SCALE INSTALLATIONS						
1. Operation of the HFR reactor	35.306	–	0.037	55.343	85	41
GRAND TOTAL	578.084	21.337	15.764	615.185	2314	1122

1 Including, in connection with the initial amount of 510.87 million ECU, an increase of 67.21 million ECU due to successive, approved or expected, adaptations of staff related expenses.
2 Supplementary funds, according to the amending preliminary draft budget No. 1-1982.
3 Supplementary funds forecast for 1983.

3. SCALE OF FINANCIAL CONTRIBUTIONS FROM THE MEMBER STATES FOR THE EURATOM SUPPLEMENTARY RESEARCH AND TRAINING PROGRAMME

Flat-rate scale

Operation and utilization of the HFR reactor:

— Federal Republic of Germany : 50%

— Netherlands : 50%

Commission of the European Communities

PROPOSAL FOR A REVISION FOR THE YEAR 1983 OF THE MULTIANNUAL RESEARCH PROGRAMME (1980 - 1983) OF THE JOINT RESEARCH CENTRE

ANNEXES

ANNEXES

ANNEX 1

Conclusions by the President of the Council (June 30, 1982)

ANNEX 1

Conclusions by the President of the Council

Session of June 30, 1982

(Original French)

New orientations for the 1984 - 1987 multiannual programme of the Joint Research Centre.

At the conclusion of a discussion on the proposals for new orientations for the 1984 - 1987 multiannual programme of the Joint Research Centre, presented by the Commission, the President of the Council drew up the following conclusions:

The Council noted the Commission's plan:

1) to insert the JRC programme into the framework programme;
2) to propose in this framework an increased effort in favour of the Super-Sara project on the basis of the conclusions of the experts consulted by the Commission;
3) to prepare proposals concerning the future of the HFR reactor in view of a decision to be taken on the occasion of the decision on the JRC programme;
4) to examine the mobility problem in this context.

It now appears necessary to carry out the work in such a way that the Council may decide its position on the reorientation of the JRC programme for 1984 - 1987 and, as a result, on the revision for 1983 of the 1980 - 1983 programme, during November and in any case before the second reading of the 1983 budget and of the amending budget for 1982.

Finally, concerning the Super-Sara project, the President noted that several delegations insisted that, whatever the outcome, the Commission should ensure that this project was more closely integrated into the set of actions of Member States in this field of the safety of nuclear reactors.

ANNEX 2

Research programme 1980 - 1983 BEFORE revision

ANNEX 2

Research programme 1980 - 1983 BEFORE revision

A. NUCLEAR SAFETY AND THE FUEL CYCLE (JOINT PROGRAMME)

A.1 **Reactor Safety** (nuclear activity)

The programme consists of the following 11 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, risk assessment and data bank.

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

The progamme 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 on 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 (JOINT PROGRAMME)

B.1 **Solar energy** (non-nuclear activity)

The programme consists of the following four projects :

- European solar test installation (ETI),
- solar energy for habitat and low-temperature applications,
- solar power plant materials,
- photo-electrochemical and photo-chemical 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 five projects :

- conceptual studies on fusion reactors,
- blanket technology studies,
- studies on structural materials,
- studies on advanced materials,
- operation of the cyclotron.

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 (JOINT PROGRAMME)

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 (JOINT PROGRAMME)

D.1 **Nuclear measurements** (nuclear activity)

The programme consists of the following two projects :

- measurement of nuclear data,
- nuclear reference materials and techniques.

E. SPECIFIC SUPPORT FOR THE COMMISSION'S SECTORAL ACTIVITIES (JOINT PROGRAMME)

E.1 **Informatics** (nuclear activity)

The programme consists of the following three projects :

- data communication,
- Eurocopi,
- European shielding information service (ESIS).

E.2 **Support to safeguards** (nuclear activity)

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

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

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

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

F. OPERATION OF LARGE SCALE INSTALLATIONS

Supplementary programme

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

ANNEX 3

Technical description of the programme 1980 - 1983 AFTER revision

A.1. REACTOR SAFETY PROGRAMME

INTRODUCTION

The year 1983 has to be considered a transition period in which a number of significant modifications will be introduced in the JRC Reactor Safety activities to prepare the next pluriannual programme 1984 - 87.
In the future programme the effort of the Commission in the field of the Reactor Safety research will be further increased, although the research activities will be concentrated on a more limited number of projects.
As in the past, the basic motivation for the development of a Communitary Reactor Safety Programme is the European interest in nuclear power plants, enhanced by the energy crisis which still remains unsolved.
This choice is also motivated by the increased public sensitivity toward the safety aspects of nuclear installations and its consequences on the licensing processes.
The proposed new programme tries also to answer specific questions related to accidents which occurred in existing plants. During the last years, in particular after TMI, the large majority of countries put major emphasis on the solution of LWR safety problems; this is related to the significant amount of LWR plants already existing and to their important increase foreseen in the next years.
The enlarged Super-Sara programme, which consists of a series of in-pile experiments redefined in 1980 on an international basis (Consensus Programme) and includes the study of fuel element behaviour when core situation becomes severely degraded and the fuel temperature very high, is certainly related to this new attitude of the different Community countries. As a consequence, the first objective of the future JRC programme is to assure more adequate resources to the execution of this ambitious programme.
In addition to the Super-Sara programme, which will be performed in the ESSOR reactor, the JRC has for several years devoted an important effort to out-of-pile studies of loss-of-coolant accidents following large, intermediate and small breaks of the primary circuit. To this aim a blowdown investigation facility (LOBI) simulating a four loop primary cooling system of 1300 MWe PWR has been built in the frame of a collaboration contract with the FRG and became operational in 1978.
The validation of the LOCA thermohydraulic codes and associated theories for safety analysis of LWR is one of the main objectives of this project. The completion of the series of tests under contract with BMFT (phase A 1) is foreseen in the next pluriannual programme. In addition, a limited number of tests available to the Community (phases A 2 and B) will be executed.
The LOBI activity will be reinforced in manpower to assure the execution and documentation of all the tests foreseen.

An important contribution is given by the JRC in the field of structural failure prevention. It involves LWR Primary System Integrity studies dealing with early failure detection, including the continuation of the PISC II exercise and the development of methodologies and calculation codes to predict the end of life of reactor components.
The development of methodologies for Probabilistic Risk Assessment is another activity which will be continued and reinforced in the next programme. These methodologies are applied to identification, modelling and analysis of LWR accident sequences, taking into account in particular the timing of the events, operator intervention and the uncertainties propagation.
The collection and analysis of nuclear plant data in a centralized data bank (European Reliability Data System ERDS) is an important tool for risk analysis. The ERDS, which is being implemented, provides information on component failures, abnormal occurrences, operator errors, plant outages, etc.

The LMFBR safety research will involve about one third of the Reactor Safety manpower at the JRC.
The maximum effort will be concentrated on the problems of post accident heat removal (PAHR), after release of molten material from the core: in-pile experiments will be performed in 1983 at Sandia, in collaboration with the USNRC and PNC - Japan. In addition, European in-pile experiments at the Mol and Grenoble sites will be initiated at the beginning of 1984.
Also for PAHR research an out-of-pile facility (FARO) able to melt about 100 kg UO_2 will become operational during the next programme with three different test sections.
In addition, two main LMFBR research areas are maintained and developed, that is the study of the multiphase, multimaterial processes related to energy released from the core (involving models development and ad hoc experiments) and the study of material properties both in operational and in dynamic situations.

In these two areas the high level competence of the JRC and the existence of very advanced laboratory equipment can represent a reference point for the national institutions.

1983 constitutes a transition year during which the above-mentioned general reorientation will be progressively implemented.

SUPER-SARA TEST PROGRAMME (SSTP)
IN-PILE TESTING LWR FUEL UNDER ACCIDENT CONDITIONS

1. Objectives

The Sara project was started in 1975 as part of an Italian Government sponsored programme in the ESSOR reactor for the study of fuel behaviour under LB-LOCA conditions. After a revision of the test matrix to include, in addition to the LB-LOCA, the new scenario raised by the TMI-2 accident in 1979, the project emerged as a consensus Community programme in 1980.

The SSTP covers fuel cluster behaviour both for the transient conditions of the "large break" loss-of-coolant accident LB-LOCA and the transient conditions which lead to partial core uncovery, higher clad temperatures and a potential for "severe fuel damage" (SFD).

The main characteristics of the Super-Sara fuel cluster are:
- 2 m active length
- 32 rods in the PWR (17 x 17) configuration or
  21 rods in the BWR (8 x 8) configuration.

2. Planned activities

The overall time schedule of the Super-Sara project during the phase of design, procurement and installation of the experimental equipment, shown in the bar chart, is aimed at starting the test execution phase in mid-1985.
The overall schedule takes into account the licensing aspects and in particular that no on-site installation work is permitted by the licensing authorities until the relevant Detailed Project (PP) is approved.
By the approval of the first PP during 1982, the installation of loop components will start at the end of 1982, and continue through 1983. In 1983, the installation of further experimental equipment, included in the second PP (e.g. Programming and Monitoring System and Watch Dog), will start.

The activity connected to test trains will be mainly devoted to finalizing their design in order to start the procurement of the first in-pile LB-LOCA and the first in-pile SFD test train in early 1984.

In order to resolve the identified problems, mainly in the area of safety, e.g. integral tests train performance, blocked channel thermohydraulics, kinetics of Zry/UO_2 kinetics and test instrumentation, an R&D programme has been defined which will partly be performed during 1983.

3. Collaborations

The SSTP is inserted into an international mosaic of research in the field of fuel behaviour of which the most important parts are the PBF (EG&G-Idaho), NRU (Chalk River) and Phebus (CEA-Cadarache) in-pile test programmes and the MRBTF (Oak Ridge) and REBEKA (KfK) out-of-pile test programmes.
In addition to the main contract with Harwell-UKAEA for the design and procurement of the SARA loop, collaboration in different areas of activity are foreseen or under way with the following organizations:

. Belgium	Belgonucléaire
. Denmark	RISØ
. France	CEA (Cadarache, Saclay, Grenoble), Technicatome
. FRG	IKE Stuttgart, KfK Karlsruhe, Battelle Frankfurt
. UK	SNL Springfields, AEE Winfrith, SRD Culcheth, CEGB Berkeley
. Italy	AGIP, CISE, ARS Milan, TEAM Rome, ENEA
. USA	USNRC, EG&G Idaho, PNL Richland, EPRI, SANDIA, ORNL
. Switzerland	Battelle Geneva, Institut Suisse de Recherche Horologique, EIR
. Norway	OECD Halden

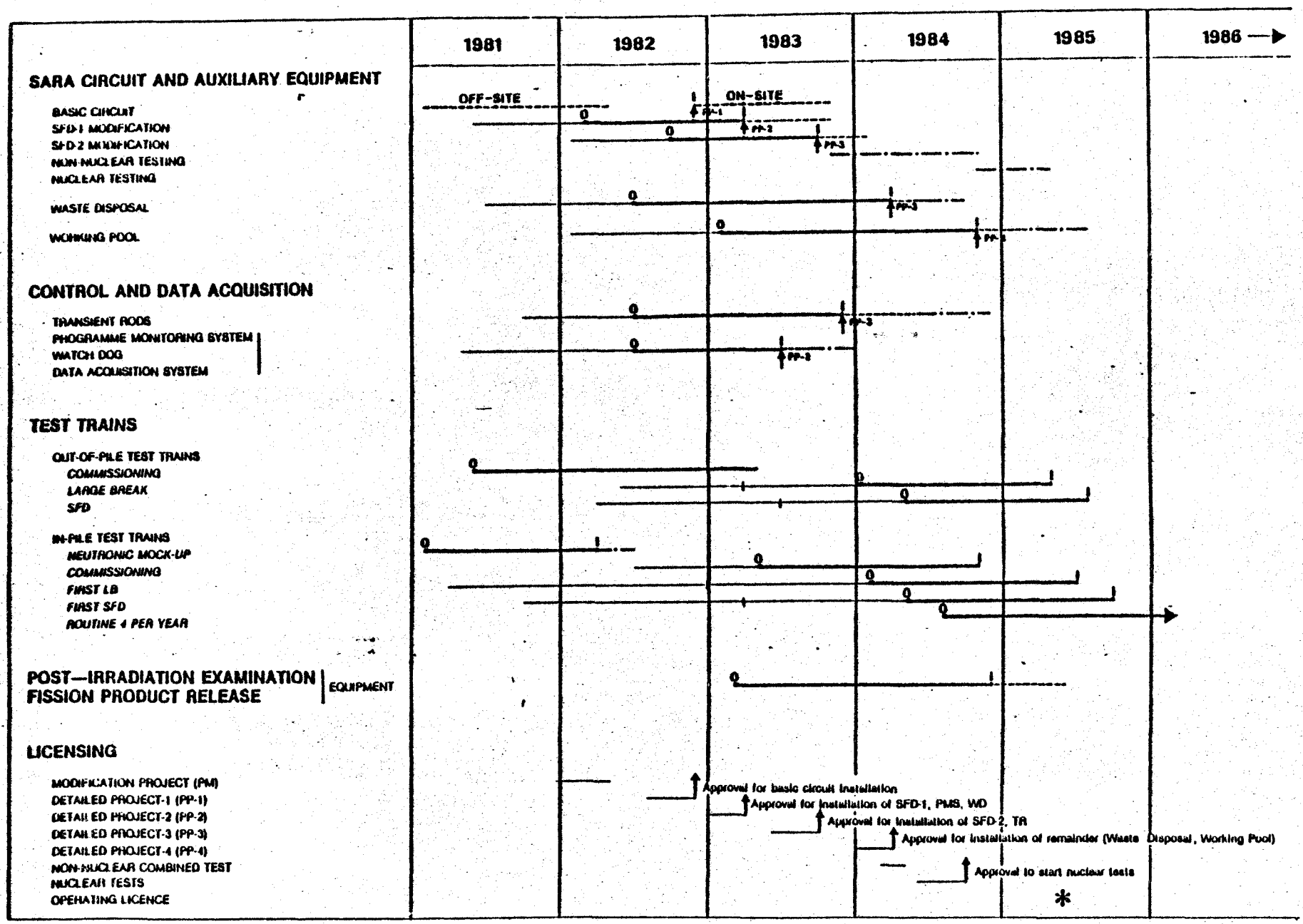

FIG. 1-SSTP MILESTONE SCHEDULE

LOBI
OUT-OF-PILE INTEGRAL SYSTEM LOCA STUDIES

1. Objectives

The LOBI project has been running since 1974 in the framework of an R&D contract between the CEC and the BMFT Bonn. The integral system LOCA studies with the LOBI facility aim at the experimental investigation of the thermohydraulic behaviour of a PWR primary cooling system during the high pressure or blowdown period of a hypothetical LOCA caused by a tube rupture within the primary cooling system. Besides the LOBI project in Europe, there are similar projects running in the world, e.g. Semiscale in the USA and ROSA in Japan.

With respect to size in terms of the scaling down factor from a real PWR, LOBI (712) with 5.5 MW heating power input to a 64 heater rod bundle, ranges between the Semiscale (2000) and the ROSA (50).

The distinguishing features of LOBI are two active loops designed placing great emphasis on simulation requirements, and a comprehensive and systematic measurement instrumentation system.

For the future small breaks and special transients programme, the significantly improved and extended LOBI-MOD2 facility will be available, which contains new and heavily instrumented steam generators, the high and low pressure injection system (HPIS, LPIS) and the auxiliary feedwater system (AFS).

2. Planned activities

The modification of the LOBI test facility started in July 1982 and leading to the LOBI-MOD2 facility which will be terminated in February/March 1983. The subsequent commissioning of the new facility requires at least two months.

The start of the last part of the A 1-test programme (available only for BMFT) comprises a total of 12 small break tests. Before the end of 1984 16 small break tests will be performed, that is 12 Al-tests, 3 A 2-tests and 1 B-test. The 12 Al-tests comprise 2 natural circulation tests for single- and two-phase flow conditions, 2 intermediate break tests with 10% break size, and 8 small break tests with the break size ranging from 0.4% to 2%, The break location varies between cold leg, hot leg and pressurizer.

The A 2- and B-tests are not yet specified. 4 Al- and 2 A 2-tests will be performed during 1983; the remaining 8 Al-, 1 A 2- and 1 B-tests are scheduled for 1984.
The essential aim of all these tests is to characterize the energy transport characteristics within the primary cooling system. These characteristics govern the heat removal from the reactor core and, hence, the core temperature behaviour under LOCA conditions.

Pre-test prediction calculations for all these tests are an essential activity of the LOBI Programme. They represent an indispensable part of the test preparation and of the results analysis allowing a first test validation by the comparison between experimental and calculation results. Post-test calculations are to be performed in those cases where either the actual test initial and boundary conditions differ significantly from the specified ones, or the differences between experimental and pre-test calculation results indicate the need for code improvements and verification.

For the small break calculations, both the RELAP5/MOD1 and TRAC-PF1 codes will be used. The required preceeding CDC-to-IBM conversion of the RELAP5 code is scheduled to be terminated in October 1982.
The corresponding converted TRAC code version is expected to become available during 1983.

3. Collaborations

Belgium	Tractionel, Université Catholique de Louvain
Denmark	RISØ
France	CEA, CEN-Grenoble, Framatome
FRG	GRS, KWU, Interatom, General Automation (Aachen), Battelle-Ffm., Dornier-System (Friedrichshafen)

UK	UKAEA-SRD, UKAEA-Harwell, NII, CEGB
Italy	ENEA, University of Pisa
Netherlands	ECN-Petten
USA	USNRC, EG&G-Idaho Inc.
Austria	Ochsner-Graz

RELIABILITY AND RISK EVALUATION

1. Objectives

The main aim of the project is to develop those tools that are needed for the carry-over of Probabilistic Risk Assessments (PRA). Taking into account the many purposes that PRAs may have (from design options to backfitting) and therefore the many levels at which PRAs may be performed (from estimation of core melting probability to evaluation of the risk to the population) we tend to focus our limited effort to improve PRA procedures in respect to risk management and feedback to operator options. Thus two main subprojects have been created: one dealing with the set up of the European Reliability Data System (ERDS), the other focusing on the development of methods for LWR accident sequence analysis.
Analysis of operational reactor data stored in the ERDS will be started in 1983 in order to provide the necessary information to the further development of accident analysis models.

2. Planned activities

a) European Reliability Data System (ERDS)

ERDS has been structured in the course of its development into four main data banks. A summary description of the 1983 program for each bank is given hereafter.

Component Event Data Bank (CEDB)

Set up of the reference classifications will be terminated by the end of 1983. Also the informatic implementation of the bank will be ready, so that the analysis of the stored data may be executed. This will make it possible to start in 1984 a more formal pilot experiment on a few power reactors.

Abnormal Occurrences Reporting System (AORS)

Various national systems and the central AORS system will be ready for interrogation already at the beginning of 1983. During 1983 a pilot experiment will be performed in order to tune the various classifications and criteria; analysis of stored data will also be started to help in defining a policy for data availability and publication.

Operating Unit Status Report (OUSR)

The computerized system is being set up, information coming from various reactors will be transcoded in the reference formats for a pilot testing of the bank.

Generic Reliability Parameter Data Bank (GRPDB)

Statistical methods for processing of the raw events stored in CEDB into reliability parameters will be implemented.

In general one may underline that, starting from next year, the activity in ERDS will be shifted from the design phase to a pilot phase involving on one side a bigger effort in divulging the bank's content and capability (through special workshops) and on the other, the start of a more systematic data analysis. Additional ad hoc data campaigns may also become necessary.

b) LWR - Accident Sequence Analysis

The activity of this subproject will continue in 1983 with the development of the following methodologies:

- Fault tree analysis: improvement of the interactive fault tree construction code SALP and set up of component failure models. Completion of the Reliability Benchmark Exercise.
- Event tree analysis: finalization of the Event Sequence Consequence Spectrum (ESCS) methodology for the analysis of particular accident sequences in which the dynamics of the incident, its time characteristics and the operator intervention are most important.

- Uncertainty analysis: further to the achievement of the Response Surface Methodology Handbook, other methods will be investigated and optimised on real cases such as Kalman filters, Latin Hypercube Sampling, Multivariate RSM. The possibility of reducing the running time of complex safety codes by implementing them in ad hoc computer architectures will also be investigated.
- Special transients: further development and application of the ALMOD code for the design of an experimental matrix of special transients in the LOBI circuit will be pursued.

3. Collaborations

National research centres and regulatory bodies: CEA, UKAEA, GRS, ENEA, NII.
Utilities: EDF, ENEL, CEGB, RWE, VGB, DOEL, KEMA, etc.
Organizations outside the Community: USNRC, NERC, NPRDS, EPRI, SKI, Vattenfall, JAERI.

LWR PRIMARY CIRCUIT INTEGRITY

1. Objectives

The project is composed of two actions: one called Programme for Inspection of Steel Components (PISC) and Performance of Non-Destructive Testing Techniques (NDT) and the other one Primary Circuit Components Life Prediction.
The first one concentrates on the effectiveness and reliability of In Service Inspection (ISI) of Reactor Pressure Vessels (RPVs). The second one aims to develop and validate on 1/5 models of RPV a systematic approach to the assessment of the residual life of pressure components combining NDT data, materials properties, fracture mechanics data, loads histories and statistical models.

2. Planned activities

a) PISC and Performance of NDT

JRC-Ispra is involved as Operating Agent and Referee Laboratory in the PISC II programme organized by the CSNI. Such an action implies for 1983:

- organization of the round robin test of 4 test specimens (about 30 tons of steel) amongst 50 teams of 15 countries;
- gathering inspection data and evaluation of results using the JRC PISC II computer code;
- active organization and execution of parametric studies (laboratory exercises) to evaluate the importance of:
  - the equipment characteristics
  - the defect characteristics
  - the cladding characteristics

  on defect detection and sizing in welds.

b) Primary Circuit Components Life Prediction

– Hardware and experimental activity

- The experimental set up for tests on scale 1/5 models of pressure vessel will be completely installed and checked (Computer Based Acoustic Emission System; Data Acquisition System; Automatic Scanner for ultrasonic inspection from inside; Pressurization System);
- The acceptance and pre-service inspections will be made on 3 vessel models before starting the research programme on one of them. Continuous monitoring by Acoustic Emission and periodic inspections by other NDI techniques are foreseen;
- The laboratory tests on specimens for characterizing the materials (SA 533 and SA 508 steels) of the models, started in 1982 will be continued.

– Theoretical activity

- The activity started in 1982 will be prosecuted, aimed at evaluating the stress and temperature distributions affecting the vessel models as a consequence of the various loading conditions. Particular attention will be paid to the problem of thermal shocks;
- A first model for elaboration and analysis of the information and for data handling will be developed.

3. Collaborations

France	CEA, Framatome, EDF, LNE, ECAN, ECN, CETIM, Creusot
UK	UKAEA, CEGB, WI, SRD, B&W, RR, NII
FRG	IZFP, BAM, GRS, KWU, MPA, Mannesmann, KWU, Univ. Munich, Univ. Stuttgart
Italy	ENEL, ENEA, CNR, CISE, BREDA, Univ. Milan, Univ. Pisa

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Belgium	Vinçotte, Cockerill
Denmark	DWI, RISØ
Netherlands	RTD, Neratom, Univ. Delft, Rotterdam Nucl. BV, KEMA
Finland	VTT
Spain	Technatom, CINSA, Equipos Nucleares
Sweden	ERC (Studsvik), TRC
USA	NBS, USNRC, GE, Westinghouse, EPRI, B&W, CBI, BNW, SWRI, SWRI, NES
Canada	AECL
Japan	IHI Japan Steel and 15 other groups
International	IIW, ISO, OECD-NEA (CSNI)

PHENOMENA RELATED TO ENERGY RELEASE IN LMFBRs
(Multiphase Multifluid Thermohydraulics)

1. Objectives

This programme is concerned with the evaluation of the mechanisms of the core expansion process following a severe core disruptive accident in LMFBRs. Such an accident is highly improbable, but the potential consequences for public safety are such that there is a need for increased realism in the modelling and calculational techniques available, founded on a broader experimental basis than exists at present.

The programme consists of two parts. The first is analytical in nature and is concerned with the development and improvement of models and codes for the description of core bubble expansion. The second is designed to supply experimental information regarding basic physical mechanisms in the core expansion process, to support the theoretical effort, and will eventually lead to the performance of more realistic simulant experiments with reactor materials and possibly with reactor geometry.

2. Planned activities

a) Theoretical Programme

The SIMMER code, which is available at the JRC by agreement with the USNRC, will be used both as a global analytical tool and as a framework within which more detailed models of individual processes can be incorporated. The theoretical developments will include:

- Analysis and modification of the SIMMER code to improve the physical realism of its representation of the core material expansion process and to improve the numerical solution techniques employed. In particular the removal or mitigation of purely numerical artefacts in the code predictions is seen as a key problem;
- The creation and validation of detailed models for influential mechanisms which are poorly modelled in codes of the SIMMER type. Entrainment at the core bubble interface is a very important example which will be treated in 1983;
- The analysis of the first simulant expansion experiments to be performed in the experimental part of this programme. The analysis is expected to lead to further model development as discrepancies between calculation and measurement arise;
- Use of SIMMER for the calculation of post-disassembly sequences for a range of initial conditions and for a selection of reactor geometries of interest in a European context. This should help to define the class of conditions and mechanisms which is of greatest interest from the safety point of view.

b) Experimental Programme

The basic physics experiments which comprise the first stage of the experimental programme will be designed to investigate the flow parameters in a multiphase system including phase velocities, temperatures, mass fluxes and pressure drops. In particular, during 1983, the first of a series of simple experiments will be carried out in which the expansion of core materials through the upper breeder structures of the core and out into the sodium pool will be investigated using scaled models and simulant materials.
Special attention will be paid to measurement techniques in a multiphase environment.

3. Collaborations

An attempt will be made to develop a programme agreed among all those organisations in the Community which already now have a small staff working in this particular area and with similar objectives (e.g. KFK, UKAEA, CENG). Continuous efficient cooperation with USNRC sponsored activities in Los Alamos is also foreseen.

POST ACCIDENT HEAT REMOVAL (PAHR) IN LMFBRs

1. Objectives

The research on Post Accident Heat Removal (PAHR) includes:

1) an in-pile project for the study of debris bed coolability;
2) the construction and operation of an out-of-pile facility for the investigation on molten pool and other relevant PAHR phenomena.

By means of PAHR-in-pile experiments the behaviour of debris beds, as they are supposed to form within the primary containment of an LMFBR after a hypothetical accident, is studied. The aim is to learn how to assure the stability of the inner reactor structures and to guarantee the final integrity of the primary containment. In order to obtain representative and well-defined PAHR conditions, the effect of decay heat is simulated by means of neutron fission.

The main objective of the test programme is to quantify heat removal upwards and downwards as a function of test parameters. A detailed study of bed behaviour and resulting phenomena such as bed channelling, onset of dry-out, and steel melting will also be undertaken. Last but not least, these tests should be used to verify and validate models and codes describing bed behaviour.

In-pile tests are under way at SANDIA (USA) in the frame of a collaboration contract with USNRC and PNC Japan. The European programme, started in 1981, has been conceived to be complementary to the SANDIA tests. Beds of UO_2 and stainless steel particles will be studied and the test sections are designed to allow for local melting of bed constituants (SS, UO_2 or SS plus UO_2). The first European tests are foreseen for the beginning of 1984.

Out-of-pile activities will be concentrated on the use of a 100 kg UO_2 melting facility which has been designed as a multipurpose plant for investigations in the areas of formation and cooling of molten pools, the analysis of thermomechanical loads on core catcher structures, fuel freezing and channel plugging phenomena and further analysis of large mass fuel coolant interactions including the study of fuel debris formation and settlement.

2. Planned activities

a) In-pile experiments

Two parts have to be distinguished:

- Development of the in-pile test sections with cooling circuits, safety barriers, control and data acquisition systems (Grenoble and Mol sites responsability). Qualified crucible development, with related material research programmes, is also included to assure the feasibility of the 3 test stages, i.e.:
  - E-1 Study of partial or total Na-dry-out of the bed and local steel melt (max T about 1550°C)
  - E-2 Study of Na vaporization and partial or total SS melting in a mixed bed (max T about 1800°C)
  - E-3 Study of Na vaporization, SS melting and partial UO_2 melting.

In order to tackle such an ambitious test programme, an out-of-pile back-up programme is performed in different European laboratories and at JRC in the following areas:

- crucible development
- development of Uts protecting tubes
- development of instrumentation: Uts, visualization, Na level indicator
- phenomenological studies.

In addition the JRC will continue the research on material compatibility and on model development.

During 1983 the preparation of E-1 tests (at Mol and Grenoble) will be completed (the E-1 tests are foreseen for the beginning of 1984) and in parallel the preparation of the E-2 series will be initiated.

b) Multi-purpose out-of-pile facility

In 1983 experiments for the validation of molten pool models will be performed in the large fuel melting facility FARO, designed to melt 100 kg of UO_2. The installation will then be used for tests in which the melt is released from the oven and enters in the test section BLOKKER. The objective is to study problems of freezing, plate erosion and thermomechanical loads. In parallel the construction of the test section TERMOS, in which the melt is released in Na, will be completed. In this test section studies on large mass fragmentation, particulate formation and settling, and thermomechanical loads on catcher structures will be performed.
In addition, the design study of the test section FRAGOR will be continued in 1983. By means of FRAGOR, the possibility of violent UO_2/Na interactions according to the thermal detonation model will be investigated. Development and validation of computer codes related to these studies will continue. The codes will be used for analysis of the out-of-pile tests and support will be given to the design of the various test sections.

3. Collaborations

The development of the test sections and the execution of the in-pile tests are contracted to the reactors:
- BR-2 at CEN-SCK Mol, Belgium
- Melusine at CEN-Grenoble, France.

Crucible development and the material research programme are being carried out under contract throughout the member countries (Lafarge Montrouge, CEA-Fontenay-aux-Roses, UKAEA-Harwell, Interatom).

The research programme for the out-of-pile facility is strongly linked to national programmes performed by CEA, KfK, ENEA.

MATERIAL PROPERTIES AND STRUCTURAL BEHAVIOUR (LMFBRs)

1. Objectives

The prediction of the behaviour of reactor materials and structures is of utmost importance for normal reactor operating as well as reactor accident conditions. The programme executed so far for LMFBRs included the development of material constitutive relations in dynamic and static conditions for virgin and damaged materials involving the study of radiation damage, creep-fatigue and cracks. An experimental and analytical programme on fracture mechanics has also been started.

In the future, the coherence of the above-mentioned activities will be intensified and the analytical effort will be increased by including in this chapter the development of the 2 and 3D structure analysis codes.

Moreover, it is worth noting that the JRC in the past has performed work under contract to determine dynamic material properties. In the future the JRC could become a reference laboratory, using the many installations already available and the large dynamic material testing machine under construction.

2. Planned activities

a) Creep-fatigue interaction

In 1983 the following experimental and theoretical activities are foreseen:

- Creep-fatigue tests (strain-controlled) under different conditions.($T = 550°C$, push-pull parameters, geometry of the samples, notched and unnotched specimens);
- Assessment of damage built up under the various experimental conditions and development of suitable non-destructive and destructive damage detection methods (density measurements and quantitative metallography analysis);
- Development of constitutive equations, that is equations describing the macroscopic behaviour of the material from a purely phenomenological point of view;
- Introduction of the damage laws in constitutive equations;
- Development of mathematical models for predicting damage due to combined effects of creep and fatigue.

b) Fracture mechanics

The FM activity deals essentially with the evaluation of irradiation damage on austenitic steels. FM tests will be run on specimens irradiated in the HFR (Petten), in the PHENIX reactor (Cadarache). Side-grooved specimens will be irradiated in HFR in order to check the sensitivity of the tearing modulus to the degree of out of plane constraint of the crack tip. Additional irradiations are planned on differently shaped specimens.
An analytical Elastic Plastic Fracture Mechanics effort on crack growth modelling will be carried out in parallel. Tests on part-through cracked cylinders in AISI 316 SPA submitted to axial forces will be terminated. These tests are run in the frame of a collaboration contract with Novatome (France).

c) Dynamic material behaviour

The specific actions of this programme are the following:

- Tensile tests under various strain-rates (10^{-6} - $10^{1}\,s^{-1}$) and temperature (20 - 800°C) conditions;
- Uniaxial tensile tests, using Hopkinson's bar devices, on small cross-section specimens of reactor materials in virgin and damaged conditions, at strain rates ranging between 10^{-2} and $10^{3}\,s^{-1}$, temperatures up to service and accidental conditions, together with an attempt to give an interpretation of the basic mechanism of the phenomena;
- Multiaxial tests in order to verigy yielding and fracture criteria with an effort to analyse stress and strain conditions during tests;
- Experiments on large specimens in order to verify the applicability of constitutive equations determined by the preceeding actions to existing large structures, using the special high load multiaxial dynamic testing device.

3. Collaborations

Italy	Milan Polytechnic, Pisa University, ENEA-Bologna
France	Novatome, CEA-DSN
FRG	Interatom-Bensberg
UK	UKAEA-Risley

PROGRAMME : A.I. REACTOR SAFETY

Resources for 1983 - Summary table

	Project	Specific Appropriations (KECU)				Research men
		Operating expenditure	Investments	Contracts	Total	
LWR	Super Sara	1302	4441	733	6476	122
LWR	LOBI	490	200	150	840	58
LWR	Reliability and Risk Evaluation	20	15	223	258	26
LWR	Primary Circuit Integrity	160	110	100	370	22
LMFBR	Energy Release	70		70	140	10
LMFBR	PAHR					
LMFBR	- In-Pile	1000	170	5240	6410	19
LMFBR	- Out-of Pile	201	140	80	421	39
LMFBR	Material Behaviour	263	85	50	398	30
	Total	**3506**	**5161**	**6646**	**15313**	**326**

A.3. PROGRAMME SAFETY OF NUCLEAR MATERIALS

INTRODUCTION

The final disposal of radioactive waste is undoubtedly one of the major issues of nuclear energy, and several projects for waste disposal, particularly concerning stable continental geological formations such as salt, clay and hard rocks have been under study in the European Community for many years.
Such projects could probably be implemented in a relatively small number of years, but difficulties and delays are being encountered due to public opposition to any in-situ activity, even of a scientific nature.
Disposal of high level waste in geological formations underlying the deep ocean is an additional option which is gaining interest at the international level.
The C.E.C. policy in waste management has been that of a strong support to the development and acceptance of waste disposal practices. Both J.R.C. and contractual activities have been under way since 1973 and 1975 respectively and a 12-year Plan of Action approved by the Council in 1980 assures continuity of R&D activities until 1992.
The advantages of developing waste management practices at a Community level are evident, and indeed the 12-year Plan of Action also entrusts the Commission with a wider role of coordination in the development of waste management policies at the Community level.
The J.R.C. programme has essentially dealt with the long-term safety aspects of radioactive waste management and the activity of the J.R.C. has considerably contributed to providing the necessary scientific basis to the C.E.C. policy in this area.
In the 1980 - 83 programme the main objectives were:

- the assessment of the long-term safety of geological disposal;
- the optimization of the alpha-waste management mainly taking into account cost and long-term safety.

Such objectives maintain their validity, and in principle the programme would not require a substantial reorientation. However, the necessity of reinforcing the Super-Sara project with chemical and radiochemical engineering experts, which are found in limited numbers at Ispra, imposes the need to terminate sooner than expected the activities on optimization of alpha-waste management strategies, and particularly the experimental activity on chemical separation of actinides from waste (Project Actinide Separation).
Minor reorientations are proposed for the other activities of the programme, which is now strongly oriented towards the assessment of the safety of radioactive waste disposal in continental geological formations and into the seabed.
There are several reasons why a reinforcement of activities connected with risk evaluation of geological disposal should occur:

- firstly during 1982 the C.E.C. initiated a coordinated action on Performance Assessment of Geological Isolation Systems (action PAGIS). The J.R.C. is strongly engaged in this action, which involves both direct activity at the J.R.C. and cost-sharing contractual activity;
- secondly the results of theoretical evaluations on the long-term safety of disposal must be supported by experimental studies which are rather difficult, due to the many parameters involved and the necessity of extrapolating the results of laboratory experiments to much longer time scales (hundreds or thousands of years).

  In such studies the J.R.C. had a pioneering activity in the Community, and the teams involved have been particularly active in the difficult task of designing long-term experiments on barrier behaviour and translating them into mathematical models for risk assessment.
- thirdly the increasing interest with subseabed disposal suggests that the experimental effort for this option on the behaviour of barriers, should be upgraded.

The programme is organised for 1983 in three projects:

1) Risk evaluation. The studies will be limited to the risk related to waste disposal, and they will not include optimization of waste arising by modification of the fuel cycle;
2) Protective barriers. The project will study the value of natural and man-made barriers which assure the confinement of radionuclides within the geosphere. It will include the study of the stability of various types of waste conditioning and the continuation of experiments on the interaction of radionuclides with geological media, including deep sea sediments;
3) Actinide monitoring. The study for the application of non-destructive radiometric methods to the monitoring and control of actinides will be continued without major modifications.

RISK EVALUATION

1. Objectives

The objectives of this project are:
- to develop adequate methodologies for the assessment of the long-term risk, both linked to disposal of waste into geological formations, and into the seabed;
- to test them through application to specific waste disposal situations;
- to utilize them in the coordinated PAGIS action developed in the framework of the Community Plan of Action.

2. Planned activities

The main features of the methodology have been previously defined. They consist of:
- identification of release scenarios, dividing risk analysis into probability and consequence analysis;
- adoption of probabilistic models; analytical codes and Monte Carlo simulations are both utilized to treat uncertainties in input data.

The collaboration with the CEN/SCK, Mol, has allowed the methodology to be tested on a specific site. The activity for the year 1983 will be mainly directed towards:
- completing a model of consequence analysis for the Boom clay formation, including normal evolution analysis and treatment of data uncertainty;
- upgrading the models of radionuclide migration, taking into account the results of the experiments carried out in the initial part of the programme;
- improving modelling activities on alpha-contaminated waste.

In the frame of the PAGIS action, a special effort will be done in intercomparison and confrontation of methodologies for risk analysis, and in assuring a common data base.

3. Collaborations

The collaboration with CEN/SCK, Mol (Belgium), is being continued, to test the risk analysis methodologies on the Belgian experimental site. Exchange of information and cooperation with national laboratories is under way through the PAGIS action.

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PROTECTIVE BARRIERS

1. Objectives

In the concept of a multiple protective barrier system against the migration to the biosphere of radionuclides which have been disposed in a geological formation, an important role is played by the conditioning of the waste and the capability of retention of radionuclides by the surrounding geological media.
The work proposed in this project will produce data concerning the release of radionuclides from the waste under conditions simulating the various types of disposal and their interaction with geological media: these data, required as input for mathematical models, are essential for the risk evaluation of geological disposal (see Project Risk Evaluation).
This work is a continuation of the activity presently in progress, in coordination with the corresponding cost-sharing contractual activities.

2. Planned activities

a) Long-term stability of conditioned waste

- Completion of the work on radiation damage of borosilicate glasses;
- Experimental tests and development of models for the long-term leaching of various materials used for the conditioning of HLW and MLW: borosilicate glass, concrete, bitumen.
  The formation, composition and stability of the surface layer of borosilicate glasses will be particularly investigated.

b) Interaction of radionuclides with geological media

- Assessment of the physico-chemical forms of radionuclides leached-out from conditioned waste;
- Study of the retardation of their migration towards the biosphere caused by their interaction with geological media.
  In relation to disposal in clay, salt and sub-seabed, simulation experiments will be carried out for normal repository conditions and hypothetical accidental scenarios.

3. Collaborations

The planned activities are carried out in strict coordination with similar cost-sharing contractual activities of the C.E.C. programme. Collaborations with CEN/SCK, Mol and PSE, Germany are in progress concerning disposal in clay and salt respectively.

ACTINIDE MONITORING

1. Objectives

The proposed activity is mainly directed to solve problems of Pu monitoring in radioactive waste. The plutonium monitoring in radioactive waste is required for the accountability of plutonium and for the control of nuclear security and radiological safety during the handling and storage of plutonium-bearing wastes.
The plutonium monitoring in radioactive waste requires the development of non-destructive radiometric techniques, based on neutron and gamma measurements.
The present proposal is a continuation of the activities currently in progress at the J.R.C. in close collaboration with national laboratories.

2. Planned activities

a) Interpretational models

- Review of the state of art in the interpretation of radiometric alpha-waste measurements, especially of neutron signal time correlation techniques;
- Edition of technical guides for analysis of alpha-waste monitoring systems.

b) Reference monitors

- Development of reference monitors for alpha-waste streams;
- calibration services for routine monitors.

c) Integral experiments in nuclear plants

- Evaluation of error statistics;
- Determination of systematic errors of in-plant monitoring systems.

d) Participation to interlaboratory tests

3. Collaborations

A collaboration has been established with the Nuclear Power Development Establishment (DNPDE) of UKAEA for the calibration and interpretation of the plutonium monitoring system of the Dounreay reprocessing plant.
The J.R.C. will contribute to the organization and execution of an interlaboratory comparison on plutonium determination in waste drums, with the participation of several Community laboratories.
A collaboration with ALKEM is in preparation in order to confront the Pulse to Pulse Time Correlation Analysis method with the presently used techniques (shift register, VDC).

PROGRAMME : A.3. SAFETY OF NUCLEAR MATERIALS

Resources for 1983 - Summary table

Project	Specific Appropriations (KECU)				Research men
	Operating expenditures	Investments	Contracts	Total	
Risk evaluation	15	–	60	75	9
Protective barriers	127	155	50	332	27
Actinide monitoring	40	–	30	70	6
Total	**182**	**155**	**140**	**477**	**42**

ANNEX 4

Opinions of the Relevant Committees

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OPINION EXPRESSED BY THE GENERAL ADVISORY COMMITTEE CONCERNING THE REORIENTATION OF THE JRC PROGRAMME DURING ITS MEETING OF APRIL 28, 1982.

During the meeting of the General Advisory Committee on 28 April, 1982, the Director General of the JRC presented proposals which aim at:

- the integration of the JRC programme in the overall strategy of Community research and development and the framework programme which is being constructed;
- coming to terms without delay with the shortage of both financial and manpower resources in the conduct of the project Super-Sara;
- maintaining a balance between the different areas of research in which the JRC is working;
- increasing the efficiency of the JRC and improving the impact of its results by a further concentration on current important themes.

The Committee:

1. Whilst regretting that the real situation of this programme execution has been revealed so late, expresses its satisfaction for the quality of the preparatory work which has led to the re-evaluation of the Super-Sara project.

2. Judges that the match between financial and manpower resources and the programme proposals is probably far more realistic than was the case of the previous Commission proposals.

3. Requests the JRC to examine once more the contents and the balance between the components of the reactor safety programme.

4. Insists that whatever the resources finally made available to the JRC, they should allow the proper execution of the approved programmes, taking account of the best estimates of the real needs for this execution.

Were present:

Belgium	:	S. Amelinckx (Chairman), P. De Meester, F. Braibant and M.R. Reniers
Denmark	:	N. Hansen
F.R. of Germany	:	W. Klose
Greece	:	D. Deniozos
France	:	B. Bailly du Bois, J. Gaussens and P. Tanguy
Ireland	:	C. Cunningham, B. O'Donnell and J. Graham
Italy	:	C. Mancini and G. Castelli
Luxembourg	:	J. Removille
The Netherlands	:	J.A. Goedkoop and A. Gevers
United Kingdom	:	G.H. Stevens, J.B. Ingram and J. Williams

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OPINION EXPRESSED BY THE SCIENTIFIC AND TECHNICAL COMMITTEE OF EURATOM CONCERNING THE REORIENTATION OF THE JRC PROGRAMME DURING ITS MEETING OF 30th APRIL 1982.

The Committee regretted being put in a position to express an opinion on this difficult subject at such short notice which did not give members either time or information to assess in sufficient depth the relative merits of the various components of the total research programme.
However, it was the majority view that the Super-Sara Project should proceed and it is our strong recommendation in view of the doubts brought about by the changed circumstances in terms of money and manpower that a final decision and authority to commit the necessary manpower and finance be taken at the earliest possible date to maintain the project momentum.

The Committee:

1. Recognizes the technical and financial interest of the Super-Sara project for the reactor manufacturers, the utilities and the licensing authorities.

2. Recognizes that the results expected from the Super-Sara test programme are complementary to the work going on in other research establishments.

3. While it could not express a quantitative opinion on the resources necessary, recommends however that the Commission use their best endeavours to:
   a) limit additional permanent staff as far as possible;
   b) draw on external qualified manpower;
   c) make use wherever possible of existing manpower working on non-nuclear programmes;
   d) avoid reducing unduly the Fast Breeder Reactor programme.

4. Supports in broad outline the proposed rearrangement of the Nuclear Component of the programme.

The Committee expressed concern at the risk to programme and costs of the remaining unknowns and in particular stressed the need for timely completion of the safety case and of the clearance of this with the licensing authority.
The Committee stressed the need to ensure that in this area of safety and safety analysis the resources necessary should be made available to the project.
The Committee concluded by stressing the importance for the Community of safe and successful completion of the Super-Sara programme.

Were present:

Belgium	:	**J. Goens**
France	:	**J. Horowitz and J.C. Leny**
F.R. of Germany	:	**A. Birkhofer and H. Trenkler**
Ireland	:	**C.F. Delaney**
Italy	:	**A.M. Angelini, G. Cesoni and B. Guerrini**
Greece	:	**M.G. Angelopoulos**
United Kingdom	:	**F.W. Fenning, H.H. Gott, D.C. Leslie (Chairman) and D.R. Lomer**

OPINION EXPRESSED BY THE ADVISORY COMMITTEE ON PROGRAMME MANAGEMENT "REACTOR SAFETY" DURING ITS MEETING OF 5 - 6 JULY, 1982

In its meeting on 5 and 6 July the ACMP-Reactor Safety has tried to re-examine the SSTP with the aim to formulate a preliminary opinion on the proposed 1983 revision of the programme.

An advice will be elaborated in a further meeting to be convened in due time before the next meeting of the Council in November 1982.

The discussion was conducted following a list of points outlined in Mr. Dinkespiler's letter to the Chairman of the ACMP. This letter was distributed as a hand-out to all members of the Committee during the meeting. Point 1.1. was discussed separately, whereas points 1.2. to 1.7. were discussed together. (Points 1.6. and 1.7. were analysed only superficially due to the lack of time).
The members of the Committee regret the substantial delay and the request by the Commission for additional staff which is outlined in the most recent documents of the ITF. According to the majority of the members the delay reduces the value of the programme.

Some additional points were made:

- by the Italian delegation which stated its agreement with the proposals of the Commision;
- by the French delegation which stated that the programme is still valid but only provided that the first test is carried out in 1985;
- by the UK and Danish delegations which wish to re-examine the programme in the light of an updated view of present needs in accordance with the recommendations to be provided by the Ad Hoc Working Group.

Concerning the discussions on points 1.2. to 1.5. the majority of the Committee could not agree in supporting the increase of staff and budget (with regard to the Council Decision of May 1981, Doc. ATO 46) as requested by the Commission for the execution of the "consensus programme".
The feasibility aspects have been extensively discussed and it was also stated that some basic technical difficulties in the execution of the programme have still to be solved.

The German delegation submitted a paper summarizing its major concerns on technical difficulties. The Committee concluded that any technical difficulties should be analysed further in the Ad Hoc Expert Working Group.

On the basis of the above general remarks, the majority of the Committee agreed on a list of topics to be analysed before the next ACMP meeting, making use of the expected contributions from the Ad Hoc Working Group and of any additional information provided by the Commission:

- Value of the consensus test matrix in the light of present safety needs, with identification of possible alternative tests in the SS plant under construction;
- Possibility of adopting a more realistic strategy from the point of view of technical feasibility by carrying out the programme on a stage-by-stage basis with the aim to reduce staff and budget requirements as compared to the document of the Commision COM(82)250.

OPINION EXPRESSED BY THE ADVISORY COMMITTEE ON PROGRAMME MANAGEMENT "MANAGEMENT AND STORAGE OF RADIOACTIVE WASTE" DURING ITS MEETING OF 7th - 8th JULY, 1982

The ACPM "Management and Storage of Radioactive Waste" reviewed the activities of the JRC on the matter (programme "Safety of Nuclear Materials") and discussed the proposal for its revision for 1983 during the meeting held in Ispra on 7th and 8th July 1982.

The approved 1980 - 1983 programme is organized into four projects, namely:

1. Risk Evaluation
2. Protective Barriers
3. Actinide Separation
4. Actinide Monitoring

The proposal of the JRC for 1983 envisages the termination of activities on project 3 (actinide separation) by the end of 1982, with a partial reallocation of personnel within the remaining projects, and a transfer of 10 research-men to the Super-SARA Project to cope with their necessity of radiochemical and engineering competences. The staff on the programme would then be reduced from 52 to 42 research-men, and this reduction is maintained in the Proposal of Guidelines for the 1984 - 1987 programme.

On such proposal the ACPM has expressed the following opinion:

1. The ACPM is not competent to judge on priorities among different programmes and on distribution of available staff and competence among them. It expresses however unanimously great concern and strong reservations on the proposal of the Commission to reduce the effort of the Programme "Safety of Nuclear Materials" by a total reduction of the staff as high as 20 %, with loss of competences which are of great importance for the programme. Waste Management is a key issue of nuclear energy, and the JRC activity, as a laboratory which is independent from national options and constraints, has always been considered by the ACPM as of considerable importance at Community level. A reduction of the level of effort for the final year of the programme will cause damages to programme activities which may be impossible to recover in the future.

2. The Committee also expresses strong reservations on the proposed termination of all activities on actinide separation from waste (project 3).
   The Committee considers that the OXAL process developed by JRC may usefully be applied on actinide separation for medium level liquid waste and it may lead to an important decrease of alpha waste arising. It recommends therefore that the development and evaluation of the process be maintained. The ACPM considers particularly important the continuation of cost/benefit evaluations of actinide separation processes, into a wider frame of studies of waste management strategies which are considered of high importance at Community level.

3. As regards the activities of the other projects of the programme the opinion of the Committee is as follows:
   Project 1 : Risk Analysis. This project is considered of highest priority, given the necessity of creating European consensus on risk evaluation of proposed disposal practices. The activity of the JRC in the frame of the Community Action on Performance Assessment of Geological Isolation Systems (PAGIS) is a focal point for Community actions in this field and it has always been highly appreciated by the ACPM who recommends that this activity be at least maintained at the present level of effort.

   Project 2 : Protective Barriers, gives the necessary scientific background to risk evaluation. The ACPM particularly appreciates the intimate links between the theoretical and experimental activities of JRC, which promises that risk evaluations will have the necessary scientific bases to withstand any possible criticism. The Committee appreciates the cooperation which has been established between national and JRC activities in the frame of the coordinated research programme on radionuclide migration.

   Project 4 : Actinide Monitoring. This project has produced important information for design and control of actinide monitoring systems and the ACPM has particularly appreciated the application of the theoretical models developed by JRC to the practical situation of the DNPDE at Dounreay.
   The ACPM considers that the contribution of the JRC to the intercomparison exercises on determination of Pu in solid waste is of greatest importance and it recommends that such actions be not put into difficulties by a reduction of staff in this project.

ANNEX 5

Financial Sheets

N.B. : These tables are an extract from the 1983 budget.

As compared to the Council Decision's annex (page 28 of the Proposal), they take into account the residuale from the 1977-1980 programme.

TABLE 1 - Programme 1980 - 1983 of the Joint Research Centre :
MULTIANNUAL SCHEDULE OF COMMITMENTS BY PROGRAMME ACTIVITIES (KECU)

Art.	Item	Theme/Programme	Approved programme						Revised programme		
			1980	1981	1982 Subsist.	1982 Budget	1983	Total	1982	1983	1980 - 83 Total
730		*Common programme*									
	7300	Nuclear safety and the fuel cycle									
		- Reactor safety	11.904	16.489	5.648	23.761	17.119	74.923	19.002	10.222	104.147
		- Plutonium fuels and actinide research	7.000	7.008	597	8.281	7.655	30.541	25	189	30.755
		- Safety of nuclear materials	1.692	1.618	4	1.727	1.530	6.572	246	88	6.906
		- Fissile materials control & management	1.671	1.532	48	1.904	1.706	6.859	246	249	7.354
		- 1977 - 1980 programme termination	503	–	–	–	–	503	–		503
		Staff appropriations	28.614	38.590	6.613	42.106	49.220	165.143	–	– 141	165.002
		Total item 7300	**51.384**	**65.238**	**12.910**	**77.779**	**77.231**	**284.541**	**19.519**	**10.607**	**314.667**
	7301	New energies									
		- Solar energy	2.215	2.082	0	2.299	1.938	8.534	300	339	9.173
		- Hydrogen production, energy storage and transport	1.335	935	0	1.153	1.044	4.467	194	341	5.002
		- Thermonuclear fusion technology	2.550	2.445	45	3.058	2.236	10.334	291	502	11.127
		- High-temperature materials	1.787	1.508	285	1.894	1.669	7.143	5	133	7.281
		- 1977 - 1980 programme termination	203	–	–	–	–	203	–	–	203
		Staff appropriations	12.483	14.150	1.606	14.383	16.419	59.041	–	765	59.806
		Total item 7301	**20.573**	**21.120**	**1.935**	**22.787**	**23.306**	**89.722**	**790**	**2.080**	**92.592**
	7302	Study and protection of the environment									
		- Protection of the environment	2.940	2.823	322	3.245	3.049	12.379	402	480	13.263
		- Remote sensing from space	1.165	1.633	317	1.780	1.560	6.455	244	280	6.977
		- 1977 - 1980 programme termination	190	–	–	–	–	190	–	–	190
		Staff appropriations	8.173	9.066	1.263	9.957	11.655	40.114	–	– 207	39.907
		Total item 7302	**12.468**	**13.522**	**1.901**	**14.982**	**16.264**	**59.138**	**646**	**553**	**60.337**

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TABLE 1 - cont.

Art.	Item	Theme/Programme	Approved programme						Revised programme		
			1980	1981	1982 Subsist.	1982 Budget	1983	Total	1982	1983	1980 - 83 Total
	7303	Nuclear measurements	5.406	4.403	26	5.756	5.010	20.601	–	921	21.522
		- 1977 - 1980 programme termination	27	–	–	–	–	27	–	–	27
		Staff appropriations	6.146	6.857	841	7.020	8.271	29.137	–	– 158	28.979
		Total item 7303	**11.579**	**11.261**	**867**	**12.777**	**13.281**	**49.765**	**–**	**763**	**50.528**
	7304	Specific support to the Commission's sectoral activities									
		- Informatics	1.106	1.237	46	1.317	1.307	5.013	169	98	5.280
		- Support to safeguards	657	560	220	— 722	562	2.721	19	67	2.807
		- Support to the Central Bureau of References	272	266	29	267	266	1.100	19	37	1.156
		- Training and education	227	279	2	296	323	1.128	44	50	1.222
		- Utilisation of research results	96	155	9	182	228	671	5	100	776
		- Provision of scientific and technical services	634	558	44	596	610	2.442	126	453	3.021
		- 1977 - 1980 programme termination	83	–	–	–	–	83	–	–	83
		Staff appropriations	6.102	6.340	983	6.474	7.562	27.461	–	919	28.380
		Total item 7304	**9.177**	**9.395**	**1.333**	**9.855**	**10.859**	**40.619**	**382**	**1.724**	**42.725**
731		*Supplementary programme*									
	7310	Operation of large scale installations	8.938	11.099	397	10.590	10.663	41.688	–	115	41.803
		- Operation of the HFR reactor	104	–	–	–	–	104	–	–	104
		- 1977 - 1980 programme termination									
		Staff appropriations	2.786	3.069	660	3.230	3.872	13.617	–	– 78	13.539
		Total item 7310	**11.829**	**14.168**	**1.058**	**13.820**	**14.535**	**55.410**	**–**	**37**	**55.447**
		TOTAL PROGRAMME 1977 – 1980 programme termination	1.110	–	–	–	–	1.110	–	–	1.110
		Specific appropriations 1980 - 1983	51.595	56.631	8.038	68.830	58.476	243.570	21.337	14.664	279.571
		Staff appropriations 1980 - 1983	64.305	78.073	11.966	83.170	97.000	334.514	–	1.100	335.614
		TOTAL PROGRAMME 1980 - 1983	115.900	134.704	20.004	152.000	155.476	578.084	–	–	–
		Programme 1980 - 1983 including revision						578.084	21.337	15.764	615.185

TABLE 2 - Programme 1980 - 1983 of the Joint Research Centre :
MULTIANNUAL SCHEDULE OF PAYMENTS BY PROGRAMME ACTIVITIES (KECU)

Art.	Item	Theme/Programme	Approved programme						Revised programme			
			1980	1981	1982 Subsist.	1982 Budget	1983	1984	Total	1982	1983	1984	1980 - 84 Total
730		*Common programme*											
	7300	Nuclear safety and the fuel cycle											
		- Reactor safety	4.518	10.212	4.663	17.231	24.361	13.939	74.923	19.023	3.568	6.633	104.147
		- Plutonium fuels & actinide research	3.265	5.839	449	7.891	9.052	4.045	30.541	24	91	99	30.755
		- Safety of nuclear materials	758	1.365	295	1.372	2.006	777	6.572	246	- 97	185	6.906
		- Fissile materials control & management	771	1.380	249	1.445	2.144	870	6.859	248	47	200	7.354
		- 1977 - 1980 programme termination	9.606	2.744	–	–	–	–	12.350	–	–	–	12.350
		Staff appropriations	28.320	40.108	5.095	42.105	49.231	284	165.143	–	- 141	–	165.002
		Total item 7300	**47.238**	**61.648**	**10.750**	**70.044**	**86.794**	**19.915**	**296.388**	**19.541**	**3.469**	**7.116**	**326.514**
	7301	New energies											
		- Solar energy	756	2.236	122	2.346	1.891	1.182	8.534	290	107	242	9.173
		- Hydrogen production, energy storage & transport	483	971	97	1.148	1.171	596	4.467	194	177	164	5.002
		- Thermonuclear fusion technology	858	2.597	208	3.127	2.314	1.230	10.334	290	256	247	11.127
		- High-temperature materials	773	1.610	324	1.575	1.783	1.079	7.143	5	89	44	7.281
		- 1977 - 1980 programme termination	3.796	921	–	–	–	–	4.717	–	–	–	4.717
		Staff appropriations	12.340	14.162	1.604	14.386	16.418	130	59.041	–	765	–	59.806
		Total item 7301	**19.007**	**22.497**	**2.355**	**22.583**	**23.577**	**4.218**	**94.236**	**779**	**1.393**	**698**	**97.106**
	7302	Study and protection of the environment											
		- Protection of the environment	1.448	2.590	556	2.834	3.201	1.750	12.379	397	156	331	13.263
		- Remote sensing from space	383	1.471	354	948	2.150	1.150	6.455	242	88	192	6.977
		- 1977 - 1980 programme termination	1.628	713	–	–	–	–	2.340	–	–	–	2.340
		Staff appropriations	8.083	9.210	1.120	9.957	11.647	97	40.114	–	- 207	–	39.907
		Total item 7302	**11.542**	**13.983**	**2.030**	**13.739**	**16.998**	**2.997**	**61.288**	**639**	**36**	**524**	**62.487**

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TABLE 2 - cont.

Art.	Item	Theme/Programme	Approved programme						Total	Revised programme			
			1980	1981	1982 Subsist.	1982 Budget	1983	1984		1982	1983	1984	1980 - 84 Total
	7303	Nuclear measurements	3.219	4.732	440	4.514	5.184	2.512	20.601	–	588	333	21.522
		- 1977 - 1980 programme termination	2.692	715	–	–	–	–	3.406	–	–	–	3.406
		Staff appropriations	6.089	6.937	761	7.021	8.271	57	29.137	–	– 158	–	28.979
		Total item 7303	**11.999**	**12.384**	**1.202**	**11.535**	**13.455**	**2.570**	**53.144**	–	**430**	**333**	**53.907**
	7304	Specific support to the Commission's sectoral activities											
		- Informatics	551	1.003	17	963	1.625	853	5.013	165	– 26	128	5.280
		- Support to safeguards	370	519	178	587	758	308	2.721	–	35	51	2.807
		- Support to the Central Bureau of References	129	259	16	203	297	195	1.100	19	16	21	1.156
		- Training and education	117	254	9	230	326	192	1.128	43	16	35	1.222
		- Utilisation of research results	15	136	8	170	175	167	671	5	88	12	776
		- Provision of scientific and technical services	243	624	19	556	639	361	2.442	146	325	108	3.021
		- 1977 - 1980 programme termination	1.006	199	–	–	–	–	1.205	–	–	–	1.205
		Staff appropriations	6.054	6.380	943	6.471	7.560	53	27.461	–	919	–	28.380
		Total item 7304	**8.485**	**9.375**	**1.189**	**9.181**	**11.381**	**2.129**	**41.741**	**378**	**1.372**	**356**	**43.847**
731		*Supplementary programme*											
	7310	Operation of large scale installations											
		- Operation of the HFR reactor -	5.661	9.092	2.879	8.686	12.609	2.761	41.688	–	101	14	41.803
		- 1977 - 1980 programme termination	2.832	798	–	–	–	–	3.631	–	–	–	3.631
		Staff appropriations	2.787	3.165	554	3.229	3.873	9	13.617	–	– 78	–	13.539
		Total item 7310	**11.281**	**13.055**	**3.433**	**11.915**	**16.482**	**2.770**	**58.936**	–	**23**	**14**	**58.973**
		TOTAL PROGRAMME 1977 - 1980 programme termination	21.559	6.091	–	–	–	–	27.650	–	–	–	27.650
		Specific appropriations 1980 - 1983	24.318	46.889	10.881	55.827	71.687	33.967	243.570	21.337	5.623	9.041	279.571
		Staff appropriations 1980 - 1983	63.673	79.963	10.077	83.170	97.000	630	334.514	–	1.100	–	335.614
		TOTAL PROGRAMME 1980 - 1983	87.992	126.852	20.958	138.997	168.687	34.597	578.084	–	–	–	–
Programme 1980 - 1983 including revision									578.084	21.337	6.723	9.041	615.185

ANNEX 6

Place of Super-Sara in the mosaic of similar experiments in Europe and in America

ANNEX 6

PLACE OF SUPER-SARA IN THE MOSAIC OF SIMILAR EXPERIMENTS IN EUROPE AND IN AMERICA

In the commercial light water reactors the fuel elements are 3.6 m (12 feet) long and are made up of 289 rods. In order to make the loss of coolant tests significant and representative, it is important that the rod length be near to that of commercial reactors and that the central rods at least are subjected to conditions which are as close as possible to the real ones.
The Super-Sara experiments will be carried out with 32 fuel rods 2 m long. With 32 rods the 4 central rods undergo conditions which are very close to those in power reactors.
Two types of experiment are planned:

a) Large breaks
The Super-Sara project can be compared with:
- FR2 Karlsruhe: experiment completed. Only one fuel rod was considered. It was interesting because irradiated elements were used;
- PBF (Power Burst Facility) Idaho Falls, USA: as in the preceding case there is only one fuel rod;
- LOFT Idaho Falls, USA: this involves a full reactor and therefore it is an integral experiment, the total outcome of which is of considerable interest but does not lend itself to a substantial analytical interpretation of the results. Super-Sara, on the other hand, is entirely devoted to the analytical aspect;
- PHEBUS Cadarache: involves 25 fuel rods 80 cm long. Complementary experiments could be carried out at the two installations of Cadarache and Ispra;
- NRU: experiment financed by the USNRC in Canada with British participation. Involves 32 rods 3.6 m long. However, this experiment only analyses one phase of the accident while it is envisaged that Super-Sara will analyse the complete sequence.

b) Severe fuel damage (severely degraded core)
This is the most important part of the Super-Sara project. There are only two similar projects:
- PBF (Idaho Falls. USA): like Super-Sara PBF can employ 32 fuel rods, but only 90 cm long. Also it is explicitly foreseen that Super-Sara will examine the deformations of the fuel cladding and the elements of boiling water reactors, while PBF is limited to pressurized water reactors;
- PHEBUS, Cadarache: to our knowledge, not yet decided upon. Smaller fuel dimensions than in Super-Sara (see point a).

Conclusion

In the field of large breaks the Super-Sara results will confirm the data obtained out-of-pile and in LOFT, PHEBUS and NRU, providing a more thorough analysis.
For Severe Fuel Damage, Super-Sara's contribution is unique on several points.
It complements the experiments in PBF.

There are considerable possibilities for collaboration with the other European programmes (Phebus, Karlsruhe and UKAEA).

There is continuing keen American interest. It is true that the Reagan administration has cut the corresponding budget, but the overall public research budget has been cut in the same way.

The JRC could contribute to the diffusion in the Member Countries of the information received from the USA programmes in compensation of the Super-Sara results.

ANNEX 7

Action of Training and Education for Developing Countries

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ANNEX 7

ACTION OF TRAINING AND EDUCATION FOR DEVELOPING COUNTRIES

1. Structure

The Institute will be made up of:

a) a staff structure and permanent management (within the duration of the Institute's programme which is a temporary and reversible project) made up of JRC staff;
b) an infrastructure provided by the host-Establishment, or lent for a duration equivalent to the duration of the approved programme;
c) a logistics service provided by the host-Establishment, or contracted out;
d) an external teaching body provided by national organisations, by means of detachments, collaboration contracts, service contracts (supply of "turnkey" courses and audiovisual products) or expert contracts;
e) lectures lent by other JRC Services or by the Commission;
f) experts provided by the JRC, directly or by contracts, for participation in group projects;
g) a social service provided either by JRC agents or contracted out and covering lodgings, food and leisure activities.

2. Fields of teaching and training

The Institute will be organised in two sections:

a) Energy Section

devoted to energy planning and the rational use of renewable energies;

b) Natural Resources Section

devoted to remote sensing and to data bases and models for the rational management of natural resources (agricultural resources, water resources, land management, etc.).

3. Activities

The Institute will organise:

a) course programmes corresponding to the two sections above;
b) practical work on computers or in the field;
c) periods in the JRC laboratories;
d) complementary study periods at other laboratories or institutes;
e) research theses;
f) case studies, of mixed North/South groups, made up of DC students and post graduates helped by JRC specialists and paid experts;
g) conferences and presentations on European Community activities;
h) visits to installations in the Community;

i) language courses;
j) cultural and leisure activities corresponding to the cultures of the students and post-graduates;
k) international thematic workshops and seminars.

4. Costs

a) The Institute needs to hire:
   . services (lecturers, teaching material and audio-visual aids, social activities, etc.);
   . work space (conference and course rooms, practical work rooms, library, etc.);
   . living space (rooms, club house, restaurant).

   The renting of rooms could come up against the non-availability of suitable buildings. The solution envisaged is therefore the finding of a promoter who is prepared to finance the construction of such buildings in return for a contractual guarantee that the Commission will rent them for a period of 5 years (e.g.) corresponding to the Authorisation of the Programme.

b) The Institute in its turn needs a guarantee from DG VIII and XVII of the number of "European Fund for Development" and "Energy Cooperation" students and post-graduates who will attend the Institute during the renting period, i.e. during the Programme Authorisation.

c) The volume of activity envisaged and therefore the level of budgetary resources is in the order of 1.5 Mio ECU per year.

ANNEX 8

Mobility and needs of personnel

ANNEX 8

MOBILITY AND NEEDS OF PERSONNEL

1. Nature and causes of the stated lack of staff

The nature is both qualitative (the spectrum of available competences develops more slowly than do the programmes so that there is an excess in certain specialities and a lack in others), and quantitative (poor balance between resources allocated and programmes assigned, resulting from incorrect practices both at the planning and decision taking level).
To an initial quantitative imbalance (the Council rejected a request for 70 extra posts when approving the 1980 - 1983 programme) have been added two aggravating circumstances: the deterioration of general and support services - a result of the ageing and reduction of staff during previous plans - and an error in prediction for Super-Sara, the relative importance of which has effects on the whole management of the Ispra Establishment and even the whole of the JRC.
The measures proposed for 1982 and 1983 of the present programme and for the next multi-annual 1984 - 1987 programme are intended to correct these imbalances.

2. Supply and demand of mobility

The demand for mobility, resulting from an analysis carried out in 1981 and at the beginning of 1982, as well as from the strategy proposed for 1982 to 1987, imposes a redistribution of jobs involving 10% of JRC staff and 15% of Ispra Establishment staff.
It is envisaged that 161 people will be recruited and that the jobs freed by 38 people in 1982 and 80 more in 1986 - 1987 will not be filled. The rejuvenating effect will therefore be quadrupled (in terms of posts) by the net increase in staff (161 against 43). To this contribution of additional staff will be added rejuvenation by natural renewal which, in this period, will involve the reallocation of 400 to 500 people.
As regards the supply of mobility one can distinguish internal mobility, which concerns the taking over of jobs by staff already present, from external mobility, which affects the filling of posts freed by voluntary (or encouraged) departures or by exchange of staff with the other Commission services, national research centres, industry and universities.
After the significant diversification efforts which took place between 1972 and 1982 and which led to a growth from 0 to 40% in the proportion of the total staff involved in non-nuclear research, internal mobility has reached its limits. It is still possible to move teams performing conventional activities (standard laboratory techniques) from one project to another. It is not, however, realistic to expect internal forces alone to create in considerable quantities the new highly specialised skills (telematics, pattern recognition, statistics, etc.) required by the development of the programmes.
It is also impossible because of age and health problems to reconstitute from existing staff teams for detached duty, intervention, radioprotection, etc. An influx of young or highly specialised staff is therefore necessary.
The supply of external mobility is at present governed by the rate of departures in retirement

(known and predictable) and departures for other reasons of health or convenience (which can only be predicted statistically).
There are usually about 60 of these departures per year for the whole of the JRC.
Experience shows that three quarters of the posts thus freed are vital for the proper operation of the services (the staff who leave must be replaced by others in the same jobs) while about a quarter of posts may be recycled (the free posts may be allocated to another use).
On this basis, external mobility is found to be about 15 posts per year on average.
It is therefore insufficient to cope, in the time available, with the planned redeployments.
Other measures should be used, some to encourage and accelerate the departure of old staff, and some to encourage staff exchanges between the JRC and national centres, universities, or industry.

3. Instruments of mobility

3.1 Research Statute

At present the statute of a JRC researcher is that of a temporary contract for a permanent post. The Member States seem very reluctant to allow an increase in permanent posts and the professional unions to accept the principle of temporary posts tied to the duration of the programmes. To the precarious nature of the job is added that of the JRC itself.
On the other hand, the temporary contract system, despite the financial aspect which the Council thought advantageous, appears unattractive to the most important classes of research workers. In fact, only the young seeking a first appointment and veterans close to retirement are interested in a five year contract with no guarantee of renewal. The result is that despite the general tightness of the job market the number of able candidates is declining.
As a whole this new research statute does not have the planned effect of mobility and calls for reconsideration.

3.2 Facilities for new arrivals

A second obstacle to mobility is the poor state of facilities for new arrivals. For the Ispra establishment, which represents two-thirds of the total staff of the JRC, there is a real accommodation problem, since the laws currently in force have caused owners to prefer sale to rental. Practically it is no longer possible to rent a villa or apartment at the official rates within a wide radius of the JRC and the high price of money discourages purchase on credit.
It is therefore essential to set up an infrastructure for new arrivals, both by extension of the "Fontanone" (Club House) and by the construction by national organisations of rentable property reserved for JRC staff, research students and long term visitors[1], together with the conclusion of an agreement with the local hotels for the contractual reservation of a certain number of rooms.

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1. For the same reason it would be a good chance to plan, with the collaboration of the Province of Varese and the Municipalities neighbouring the JRC, together with private or public investors, the construction of an International Conference and Congress Centre, to supply the growing needs of the JRC for a site for colloquia, symposia, workshops, exhibitions, courses and conferences.

The JRC's internal reception facilities for professional activities are also too weak. The scientific buildings are scattered over a wide area, and no runabouts are provided so that it is not easy to collect teams together for temporary projects or to lay the foundations for international working groups (NET project, European Pattern Recognition Institute, projects associated with remote sensing, etc.).
The solution, which has been under discussion for several years and has now become urgent, is to set up a multipurpose "transit" building dedicated to temporary groups and those in transit to a permanent location.

3.3 Exchange of research workers and groups with national organisations

The Commission is currently holding discussions with national ministers and research organisations to identify suitable ways and funding to encourage the detachment of groups either from the JRC to these organisations or vice versa.
As a suggestion, groups of highly-qualified specialists could be attached to the JRC by mobility contracts without prejudice to their career in their home organisation. This formula would be ideal for the launching of community projects, it would on the other hand be difficult to apply to the basic tasks like those of the general and supporting services.
This formula completes the "stimulation"[1] kit now under study by the Commission.
The JRC will take account of this possibility in its proposal for the 1984 - 1987 programme to the extent that all or part of the planned recruitments could be exchanged for detached staff.
The costs of these detachments would be covered by a contract with the "loaning" organisation, covering staff and management costs, and supplemented by a contract with the individual involved covering his travel, installation, expatriation and other expenses.
The necessary credits would in part come from the credits initially allocated for recruitments (now otiose) and in part by an ad hoc budget entry covering the mobility costs mentioned above.
On the other hand, the JRC has not taken account of this possibility in the transitional measures proposed for 1982 - 1983 because rightly or wrongly it considers that such measures which are still at the discussion stage, could not play much part in satisfying the staff requirements of the JRC for the immediate future, at least as far as the budget is concerned.

3.4 Repartition of the posts requested for 1982

a) Management staff
   1 - A2 Head of the Super-Sara project and responsible of the Department B
   1 - A3 Head of Super-Sara project activities in the Department B
   1 - A4 Administrative head of the Institute for Developing Countries

b) Staff for remote sensing activities
   2 - A6 and 2 - A7 (1 agronomist, 1 pedologist, 1 responsible for apparatus assembly, 1 responsible for measurement campaigns, 1 mathematician statistician)
   5 - B3/B5 1 systemist, 2 programmers, 1 physicist, 1 responsible for instrumentation
   1 - C4/C2 Operator

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c) Staff for Super-Sara

1 - A7	Mechanical engineer
4 - B5/B3	Health physics team
4 - C4/C2	
3 - B5/B3	Meteorology and site monitoring team
5 - C4/C2	
1 - C4/C2	

d) Staff of the Institute for Developing Countries

1 - A6	Stage organisation
1 - A7	Stage organisation
1 - B2	Administrative secretariat
2 - B4/B5	Responsible for laboratory work
1 - C4/C2	Factotum

3.5 Repartition of the posts requested for 1983

a) Staff for the activity Support to CBR

1 - A6 S/T	Chemist for preparation and characterization of reference materials
1 - B3 S/T	Chemical technician
1 - B4 S/T	Chemical technician

b) Staff for the activities in favour of Developing Countries

2 - A4 S/T	Heads of 2 scientific sections (Remote Sensing, Energy Supply)
1 - A5 S/T	Trainer-researcher (in the 2 scientific sections)
1 - A6 S/T	Trainer-researcher (in the 2 scientific sections)
1 - B1 S/T	Responsible for the laboratory work
1 - B3 S/T	Responsible for the laboratory work
1 - C3	Secretariat
1 - C4	Secretariat

c) Staff for Fusion activities

1 - A5 S/T	Electro-mechanical engineer
1 - A6 S/T	Neutronic engineer
1 - A6 S/T	Engineer with competences in safety analysis of nuclear installations
1 - A7 S/T	Electro-mechanical engineer
1 - A7 S/T	Engineer with competences on the calculation methods for fluodynamics and heat removal

d) Staff for the Reactor Safety activities (LOBI, PAHR, Risk Analysis)

1 - A6 S/T	Nuclear engineer (Risk Analysis)
1 - A7 S/T	Nuclear engineer (Risk Analysis)
2 - A6 S/T	Thermohydraulic engineers (LOBI)
1 - A7 S/T	Thermohydraulic engineer (LOBI)
1 - A4 S/T	High temperature technology engineer (PAHR)
1 - A7 S/T	Analyst (PAHR)

e) Staff for Reactor Safety activities (Super-Sara)

1 - A4 S/T	Thermomechanics and thermohydraulics
1 - A4 S/T	Data control and acquisition
1 - A5 S/T	Circuit engineering
1 - A5 S/T	Safety analysis and quality control
3 - A6 S/T	Thermomechanics, thermohydraulics and analysis of the structures
1 - A6 S/T	Radiochemical engineer
1 - A7 S/T	Mechanical engineer for ADECO (Atelier de Démantèlement des Combustibles)
1 - A7 S/T	Metallurgist (medium activity laboratory)
1 - A7 S/T	Health physicist
1 - B2 S/T	Radiochemist
1 - B2 S/T	Mechanical technician
1 - B2 S/T	Electrical technician
1 - B3 S/T	Programmer
1 - B3 S/T	Electrical/electronic technician
3 - B4 S/T	Mechanicians, electricians, nuclear electronicians, instrumentalists
5 - B5 S/T	"
2 - C3 S/T	"
2 - C4 S/T	"
1 - C3	Administrative secretary at the transport service
1 - C4	Administrative secretary for the Health Physics service

3.6 Staff requested for 1983

Category and grade	Scientific and technical[1]	Administrative[2]	TOTAL
A1	1[4]		1
A2	9[5]	1	10
A3	31	7	38
A4	153	12	165
A5	209	15	224
A6	94	2	96
A7	40		40
Total	**537**	**37**	**574**
B1	109	26	135
B2	206	31[6]	237
B3	179	27[6]	206
B4	159	20[7]	179
B5	43	10[7]	53
Total	**696**	**114**	**810**
C1	262	124	386
C2	266	122	388
C3	46	41	87
C4	5	11	16
C5			
Total	**579**	**298**	**877**
D1	19	30	49
D2	1	3	4
D3			
D4			
Total	**20**	**33**	**53**
GRAND TOTAL	**1832[3]**	**482[3]**	**2314**

1. All staff employed in scientific or technical departments and performing either scientific, technical or general work (including managerial staff) are considered as occupying scientific or technical posts.
2. The following are considered in principle as occupying administrative posts: all staff assigned to administrative, financial and supply departments of the establishments; all secretaries, whatever the department to which they have been assigned; and the small number of staff assigned to scientific and technical departments who are made available to the supply departments of the establishment.
3. Of the staff covered by the budget, the following may be included, as shown, under either of the heads "scientific/technical" or "administrative":
   a) category B staff in scientific/technical posts A5/A8 and administrative posts A7/A6 provided for in the budget, up to 5% of these posts;
   b) category C staff in B posts provided for in the budget, up to 5% of these posts;
   c) category D staff in C posts provided for in the budget, up to 5% of these posts.
4. Official under the provision of Article 93 of the Staff Regulations.
5. Including one A1 at personal title.
6. Including seven posts of secretarial assistant.
7. Including eight posts of senior secretarial assistant.