COMMISSION OF THE EUROPEAN COMMUNITIES

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NUCLEAR SAFETY IN THE CONTEXT OF THE EUROPEAN COMMUNITIES

THE REPORT OF THE EXPERT GROUP ON NUCLEAR SAFETY

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COMMISSION
OF THE
EUROPEAN COMMUNITIES

Cover note

Following an accident that occurred in a nuclear power station at Three Mile Island (USA), the Commission decided to set up a group of high-level independent experts in the field of nuclear safety.

The Group's task was to advise the Commission on all problems relating to the present situation regarding nuclear safety within the Community, including its implications where radiation protection is concerned, and to evaluate the activities conducted by Community institutions in this field for the purpose of formulating any suggestion that may serve as a basis for measures to be taken by the Community.

On completion of their deliberations, the experts submitted to the Commission a report giving their opinions and recommendations on various specific subjects. Some of these recommendations are addressed to the competent authorities in the Member States and to the nuclear power station constructors and operators and others to the Commission.

The Expert Group has thus formulated independent views and recommendations for action that without doubt make a significant contribution to the thinking in the Member States and the Community on problems regarding nuclear safety.

The Commission has noted that certain recommendations are already put into practice in the Member States while others are also already the subject of Community activities in pursuance of the Euratom Treaty. A third category of recommendations covers aspects that fall within the virtually exclusive responsibility of the Member States and in respect of which the Commission's role can only be to promote dialogue.

Taken as a whole, the recommendations addressed to the Commission will have to be studied in detail, in particular where they must be appraised in relation to the obligations deriving from the Euratom Treaty, before any new proposals for action can be drawn up. The Commission attaches special importance to the recommendations on:

- the development of consistent administrative procedures for recording the individual dose equivalents accumulated by "migrant" maintenance workers throughout the Community;
- the establishment, in conjunction with power station operators, of a European Equipment Reliability Data System;
- the establishment of a system for the rapid communication of information on abnormal events occurring in nuclear power stations;
- attempts to find common approaches to reactor siting;
- the compilation of a list of conventions and agreements between Member States on information and assistance in the event of an emergency;
- the holding of seminars on simulators and control-room layout;
- the promotion of regular exchanges of information on improved maintenance procedures between reactor designers and operators in the various Member States.

The Commission considered, however, that there was no need to wait for specific proposals for any new activities to be prepared before forwarding, for information, the report of the Expert Group to the Council, the European Parliament and the Economic and Social Committee.

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NUCLEAR SAFETY IN THE CONTEXT OF THE EUROPEAN COMMUNITIES

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Brussels
May 1980
Revised September 1980

NUCLEAR SAFETY IN THE CONTEXT OF THE EUROPEAN COMMUNITIES

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CHAPTER 1

INTRODUCTION

The Group was established as a result of the Commission Decision of 16 May 1979 (reproduced in Appendix 1) and the members were appointed by September 1979. The Group comprised: H J Dunster,
D G H Latzko
D Smidt
S Villani

J Van Caeneghem was appointed by the Commission to be our Secretary. We held our first meeting on 2 October 1979 and elected H J Dunster as Chairman. We have met approximately monthly thereafter. In total we have held seven meetings.

1.1 The Aim and Scope of our Work

In keeping with the Commission's decision, our aim has been to provide the Commission with suggestions concerning future Community action in the field of nuclear safety. While this aim by itself provides for certain limitations in the scope because of the Commission's role in nuclear safety, which is complementary to that of the Member States, the terms of reference set out in the Commission's decision are so wide that we, as a group of four with a staff of one, found it imperative to define further limits to the scope. This was first set out to the Commission in the following statement:

> "The Group considered the mandate defined for us in the Commission Decision of 16 May 1979.
>
> We reviewed the very broad scope implied by article 2.1 of that decision against the inevitable limitations imposed in practice by the time and effort available for our work and against the extent of our individual expertise.
>
> We concluded that we should concentrate our efforts on topics which we considered to be important to the definition of the Community's future role in nuclear safety and agreed to interpret article 2.1 and to assess the priorities for the items in article 2.2 in that light".

The practical development of this statement led us to exclude from our considerations topics in which we, as a group, felt we lacked the necessary expertise: physical plant protection, reprocessing of nuclear fuel, radioactive waste disposal and the decommissioning of nuclear installations. Apart from our own limitations, we would not advocate the discussion of physical plant protection in widely accessible reports such as the present, as this might create more risks than benefits. We were encouraged to exclude reprocessing and waste disposal by our awareness that a comprehensive and authoritative review of the relevant technologies had recently been completed in the International Nuclear Fuel Cycle Evaluation (INFCE). Decommissioning is also the subject of international discussion which we expect will continue.

We have concentrated our discussion of the Community's research programme on the initiation and management of programme items. An independent review of the content of the programme, even if limited to reactor safety, would need substantially more effort than was provided for in setting up this group.

Although the Group was established as the result of the accident at Three Mile Island, our terms of reference have led us to examine a number of aspects of the Community's work in nuclear safety in a general way, while keeping the lessons of the Three Mile Island accident in mind. Much of our work has, therefore, been of a general nature. Its technical content focuses on the reactor aspects of nuclear safety. Where we have needed to be specific to a particular reactor system we have dealt with the pressurised water reactor (PWR) because this is the most widespread type of reactor in the Community.

1.2 Our Report

There are wide variations in the extent to which Member States are involved with nuclear power. Some points are made in the report which will already be commonplace to many people. Nevertheless, the report should be heeded by all concerned. Nuclear safety is of Community-wide - indeed, of world-wide - importance because a bad accident anywhere in the world would have major repercussions everywhere. The accident at Three Mile Island had almost no consequences for public health but its impact across the World has been very substantial.

In the remainder of this report we deal with, and make recommendations on, a number of topics mainly of a technical nature. In some cases we have included more detailed material in appendices. Finally, in Chapter 10, we make some general recommendations and draw some general conclusions.

Our task has been to advise the Commission, and many of our recommendations therefore deal with specific Commission functions. However, we are concerned with nuclear safety in the Community and some of our recommendations deal more generally with nuclear safety issues. We hope these recommendations will be of interest to the national authorities of the Member States as well as to the Commission.

1.3 Acknowledgements

We are very grateful to our secretary for the excellent work he has done in arranging our meetings and dealing with our working papers and records. We are also grateful to the Commission and its staff for the substantial flow of information which they have provided and for the convenient arrangements which they have made for our meetings.

CHAPTER 2

SAFETY CRITERIA AND SAFETY ASPECTS OF THE DESIGN OF PRESSURISED WATER REACTORS

2.1 Introduction

While the Three Mile lsland reactor was a Babcock and Wilcox design, only one of which is presently under construction in Europe, many of the lessons learnt from the accident at Three Mile Island are of a general nature. Our approach in the review of reactor safety aspects has therefore been to first look at the two PWR designs predominant in the Community, viz. that deriving from Westinghouse and used in France, Italy and Belgium, and the Kraftwerk Union (KWU) design used in Germany and the Netherlands, and investigate some safety-related generic differences between these two designs. We concluded that these differences were due principally to differences in design philosophy rather than in national criteria or requirements. We then proceeded to establish the main lessons from the Three Mile Island accident that might be generally applicable to the safety of PWRs in the Community. Finally, we briefly state our views on the usefulness of harmonisation efforts by the Commission concerning safety criteria and regulatory rquirements.

One very important point for the safety of PWRs is the integrity of the reactor pressure vessel and the primary circuit. Because of the comprehensive national efforts and the regular meetings of international specialist committees, which provide for detailed studies and for the adequate exchange of information in this area, the Group has not discussed this topic.

There is one notable way in which European practice differs from that in the United States of America. Generally speaking, the electricity supply companies in the Community either supervise themselves the design and construction of entire plants or arrange for the design and construction to be in the hands of a single large and experienced vendor having effective feedback of operational experience. In the United States, it is common for the nuclear island to be provided by one supplier and the remainder of the plant by others. We believe that there are significant safety advantages in the former basis of supply, as it avoids the risks of interface difficulties that may arise from the dependence of a utility on information supplied by vendors with separate responsibilities.

2.2 A Comparison of Safety Principles and Design of PWRs in the Community

We have considered a number of safety systems in which we see significant differences between the Westinghouse and the KWU designs. Some features of other European reactors have also been taken into account.

2.2.1 Redundancy and Diversity in Engineered Safeguards

In general terms, redundancy is provided to ensure that single failures cannot invalidate a safety system, while diversity between redundant systems is introduced to reduce the probability that a common-mode failure will invalidate several equivalent systems at the same time. Redundant systems may be completely independent (not interconnected) at all stages of a sequence of functions, or they may be interconnected so that the sequence of a function can be diverted from one chain to another in the case of a partial failure. The former arrangement gives a very simple system of control and provides a high standard of protection against faulty operation. The interconnected system, however, gives greater operational flexibility, which can be value to skilled operators, but which may sometimes be achieved at the expense of a loss in genuine redundancy. In particular, the necessary degree of redundancy may be omitted from the interconnection. For example, a single component, such as a storage tank, may service all the otherwise redundant systems. Such a provision would be prohibited by a rigid refusal to accept interconnected systems. In short, while interconnection does not of itself result in a reduction of redundancy, its use in practice often has that effect.

There is a close relationship between the degree of redundancy adopted and the emphasis placed on diversity. For example, Westinghouse plants have diverse driving mechanisms for auxiliary feed-water pumps, one being electrically driven and the other driven by a steam turbine. The KWU system uses more redundancy but the same type of drive mechanism, though with diverse design and separate power supplies. Diversity has obvious merit in principle, but introduces the problems of more complex maintenance procedures. As far as we are aware, the advantages can be demonstrated theoretically, but have not been observed in practice.

2.2.2 Automation

The use of automatic arrangements to control reactors in both normal and abnormal situations has been increasing and the differences between reactor systems depend more on the date of design than on the difference between manufacturers. Automation has a number of identifiable advantages:

- it can help to avoid operator errors:
- it provides an integration of different inputs of information; and thus relieves the operators of unnecessary detailed interpretation;
- it can initiate those actions which are thought always to be appropriate in abnormal situations and thus can reduce to a minimum those decisions which are a matter of judgement;
- it provides necessary time for careful consideration of the subsequent operator actions.

There is an increasing tendency for plants to be designed so that operations in the 30 minutes following a shut-down initiated by a fault can be conducted automatically and can be overriden by the operator only in exceptional circumstances.

The successful specification of the automatic action following this type of shut-down requires that the designers shall be able to foresee the possible situations sufficiently clearly to establish shut-down procedures that are appropriate in all circumstances. This does not mean that they have to be able to predict all possible accidents, but only that the proposed automatic actions should be reasonably appropriate in all situations, whether foreseen or not. We believe, and the accident at Three Mile Island supports that belief, that design weaknesses in automatic systems of this kind are less likely to lead to trouble than manual intervention by operators in situations which neither they nor the designers had previously foreseen.

Associated with automation is the use of data processing to display information to the operators. Even if the operators do not need to intervene in the 30 minutes following the initiation of a shut-down, they need to have detailed information about the state of the plant and the development of abnormal conditions in order to predict what is likely to happen and to plan the longer period operations. In particular, they need information on which to base the initiation of emergency plans, both on- and off-site. We return to this point in Chapter 6. While existing European systems are better than those at Three Mile Island, additional improvements still need to be considered.

2.2.3 The Procedures for Dealing with Small Leaks in the Primary Circuit

There is a difference between the KWU and Westinghouse designs in respect of the provision of high pressure injection of water following the occurence of small leaks in the primary circuit. The Westinghouse reactors, like other US designs, have provision for injection at, and above, the normal primary circuit operating pressure of make-up water and of a supplementary shut-down solution containing boron. In KWU reactors, the secondary system is used automatically to reduce the primary pressure by reducing the primary temperature at a rate of 100 K/h. Emergency core-cooling water cannot be injected until the primary pressure has fallen to 11 MPa (110 bars), the zero-flow delivery head of the HP injection pumps. Framatome has also introduced a similar automatic temperature reduction.

Although at Three Mile Island the automatic injection of emergency cooling water was initiated at a pressure well below the normal operating pressure of the primary circuit, the capability of the HP injection system to produce pressures above this operating pressure appears to have introduced into operator training the concern that there would be a danger of forcing steam out of the relief valves until the primary circuit went "solid". This concern would not have arisen if all the injection systems had been designed to operate only at pressures below the normal operating pressure.

Nevertheless, the failure of the relief valve to close could still have led to a dangerous situation and, for this reason, most European PWRs have been supplied with automatic block valves in series with the pressuriser relief valves.

2.3 Some Lessons from the Accident at Three Mile Island

In the US there has been a marked exphasis on the operator weaknesses demonstrated by the accident at Three Mile Island. This accident, however, also provided a number of detailed lessons for the designers of nuclear power plants. We consider the following design issues to be of particular relevance.

1. One of the most important lessons was the emphasis on the need to consider a wide range of accident conditions and not to concentrate on only the worst accidents. A great deal of attention has been paid to loss-of-coolant accidents involving major leaks in the primary circuit but, until recently, inadequate attention has been given to the consequences of small leaks. This has occurred in spite of the fact that the Rasmussen report[1] had identified a number of small loss-of-coolant events which could lead to partial melting of the core. In this connection it is noteworthy that European reactors have several design features which makes them less susceptible to the effects of small leaks than, for example, the design adopted at Three Mile Island.

2. The second lesson concerns the undesirability of allowing operators to intervene to reverse safety measures which have been initiated automatically. They should, however, be permitted to supplement safety measures which should have occurred but which, for some reason, have failed to do so. The 30 minutes period referred to above and now employed by all European vendors is a good working solution.

3. There is a neecd for instrumentation capable of acquiring all relevant information on the conditions in the primary system (liquid level, boiling margin, core temperatures) under emergency as well as normal operating conditions.

4. Good design of the control room instrumentation and the use of data processing are important in ensuring the transfer of all relevant information to the operators under emergency as well as normal operating conditions.

5. In view of the subsequent event at Crystal River all the instrumentation providing information or control functions in the control room should be equipped with power supplies of a reliability comparable with that needed for essential safety instrumentation.

2.4 Recommendations

1. Reactor systems should be designed to provide for automatic sequences for shutting down and cooling the reactor after all faults. Only in very exceptional circumstances should these sequences be subject to cancellation by the operators in the first thirty minutes or so, but provision for reinforcement by the operator of some functions is desirable.

2. The primary system instrumentation should include indicators of liquid level in the core or pressure vessel and boiling margin.

3. There should be a comprehensive provision of relevant information to the operator using the techniques of data processing. To this end, the Commission should urgently organise seminars on simulators and on control room layout, bringing together utilities, reactor designers, equipment suppliers, architect engineers, and ergonomists. In addition, the Commission should make the maximum use of the developments in the communication links between operators and process plant achieved in the framework of the OECD project at the Halden reactor.

4. Many new developments can be applied in practice only to new reactor designs. However, significant technical improvements should also be applied to existing plants whenever this can be done without unreasonable economic penalties.

2.5 The Harmonisation of Criteria and Regulatory Requirements

Substantial emphasis has been placed by the Commission on the advantages of harmonisation of criteria and regulatory requirements, but there has been a tendency to reduce this emphasis in recent years. It is now clear that there will be only a limited international trade in the Community in complete reactor systems, and that there will be no need for one Member State to accept the decisions of other states' licensing authorities on reactor design matters. In this situation, one of the principal values of harmonisation is in providing, as a common objective, a minimum standard of safety. Harmonised criteria for reactor assessment would also help in resolving some of the difficulties faced by a Member State in accepting a power plant near its frontier but in another country.

More comprehensive moves towards harmonisation would be of value if the Community were moving rapidly towards the provision of a central licensing and regulatory authority for the whole of the Community. We do not think that this is sufficiently imminent to justify any determined effort to achieve harmonisation from the centre. We support the way in which the Commission is now working, in particular by the provision of dialogues and discussions, and by the identification and exchange of information and documentation on safety methodology, criteria, codes and standards, and on specific safety programmes applicable to light water reactors in the various member states.

In saying this, we are conscious that harmonisation of detailed regulatory arrangements has certain disadvantages which have to be outweighed by the advantages; in particular we believe that a closely harmonised system would be cumbersome, complicated and inflexible in operation, and would tend to operate in a remote manner because of the inevitable distance between the Commission and the licensees in the Member States. There is also a tendency to reach agreement in harmonisation discussions only on the basis of the least restrictive standards and there is often a failure to realise that there may be several acceptable solutions to any single problem. Hence the relationship between the harmonisation of safety criteria and safety itself tends to be remote.

2.5.1 Recommendations

1. Harmonisation in the field of nuclear safety should proceed as a natural process resulting from a continued series of discussions and not as the result of a policy imposed from the centre.

2. The Commission should retain its function as a clearing house for information and ideas and thus encourage this natural process.

References

1. US Nuclear Regulatory Commission. Reactor Safety Study: an assessment of accident risks in US commercial nuclear power plants. WASH 1400. USNRC, Washington DC, 1975.

CHAPTER 3

POWER PLANT STAFF

3.1 Operators and Supervisors

The first area of concern is the selection of reactor operating staff. We recommend that any person selected for reactor operator training should have at least several years' experience in a position involving both significant personal responsibility and long uneventful periods. Typical jobs in point are found, for example, in the operation of fossil-fired electric generating plant, chemical or petrochemical plant, or marine propulsion plant. Furthermore, candidates should be subjected to and pass ability tests, possibly of a kind similar to those applied to prospective airline pilots. Finding suitable candidates answering such requirements obviously implies that they be offered commensurate career opportunities.

3.1.1 Training

Training itself may be carried out either by the utility at an existing nuclear power plant, by a separate training school, or by both. In each case, both curriculum and instructor qualifications should be subject to periodic review by the national safety authority (or an independent body designated by that authority). No such training should be regarded as satisfactory unless each trainee has regular access to a control room simulator where he is trained to react properly to progressively more complex transients of the sort he may encounter in the plant which he is to operate. This implies that simulators should be programmed to include serious events, such as loss of primary coolant from small breaks followed by failures of the safety systems. We recommend that the Commission should organize a seminar to bring together all parties concerned with the use of reactor simulators for the purpose of defining such transients and exchanging information on the required software.

Training should also cover situations requiring post-damage control. Operator behaviour in such situations should be rehearsed during emergency exercises, the scope of which should be defined in concert with the national safety authority. The latter should also be informed of any changes in operating instructions resulting from such emergency drills.

In addition to formal training, attention should be paid to career planning so as to provide a sound basis of practical experience on the job. Neither formal training nor practical experience is sufficient on its own.

3.1.2 Approval of Operating Staff

The arrangements for the approval of operating staff should satisfy the requirements of the national safety authority. Where this body decides to delegate the power of approval to either the utility or a third party (e.g. a reactor training school), such delegation should be defined in writing and remain subject to withdrawal, either on an institutional or on an individual basis, at the national authority's discretion.

In view of the differences in practice existing between Member States, we do not recommend mandatory re-approval. Nevertheless, the national safety authority should verify that simulator training and medical checkups take place at regular intervals, preferably not less than once every second year.

3.1.3 Control-room Layout

No amount of training can avoid operator errors due to inadequate control-room lay-out, instrumentation and data processing. This supports the recommendation made in Section 2.4 concerning control room layout. In addition, we believe that the design of control-rooms will not be fully successful unless operting staff who have experience of work in control rooms are directly involved in the design work.

3.1.4 Operating Procedures

An important aspect in the effective functioning of the operators, and one that tends to be easily overlooked, is the availability of clear, unequivocal, and up-to-date operating procedures and instructions. Much may be gained by the continuous involvement of the operators themselves in the generation and adaptation of these procedures and instructions. While this is a matter of internal organization at the utilities, its importance to nuclear safety appears such as to warrant the suggestion that national safety authorities try to stimulate operator involvement. We recommend that the preparation of these procedures and instructions should be made part of the national safety authority's requirements.

3.2 Maintenance Staff

While the above material specifically refers to operating staff, great care should be taken to ensure proper training of, and instructions to, maintenance staff. Both probabilistic studies, and the actual accident experience at Three Mile Island, indicate the high relevance of maintenance procedures to nuclear safety. It should not be forgotten that the hostile environment and the rigorous safety requirements combine to create a significantly heavier burden for maintenance staff in nuclear plants than is carried by their counterparts in fossil-fueled power stations. It seems desirable that this be reflected in both their training and their status.

3.2.1 Radiation Exposure Management

In existing PWRs, more than 80% of the total collective dose equivalent is received during maintenance operations (the percentage for BWRs is of the same order). There is also a tendency for the average annual collective dose equivalent per unit of energy produced to increase over the first 10 years of operation for PWRs in OECD countries. There are variations with the year of commissioning and between countries and reactor designs, but overall, there are strong grounds for working toward reduction in both individual and collective dose equivalents by a number of technical measures. These include the reduction of corrosion in the primary circuit by improved water chemistry, increased purification of the primary coolant, appropriate materials in the primary circuit increased accessibility by attention to layout, and the increased use of remotely controlled maintenance tools. The necessary research and development work should be encouraged and should be supported by the Community. In the meantime, particular attention should be paid to the recording and control of the dose equivalent received by "migrant" maintenance workers to reduce the likelihood of their receiving excessive dose equivalents.

3.3 Senior Management

Line management staff, including senior management, must have sound technical knowledge of their plant and must be supported by technical staffs with access to recent developments and experience elsewhere.

3.4 Recommendations

1. The national safety authorities of Member States and the utilities should review their practices in the light of the comments and suggestions made in this Chapter.

2. The Commmission should promote the regular exchange of information on improved maintenance procedures between reactor designers and operators in different Member States.

3. The Commission should promote consistent administrative procedures for recording the individual dose equivalents accummulated by "migrant" reactor maintenance workers throughout the Community.

CHAPTER 4

INFORMATION AND DATA BANKS ON ACCIDENTS AND EQUIPMENT FAILURES

The future assessment of the safety of nuclear installations depends heavily on a detailed and thorough understanding of failures that have occurred in the past. Many countries, including some of the Member States of the Community, are establishing data banks on the types and frequencies of failure of different kinds of equipment and complete systems, and an increasing amount of information is now available commercially. A good deal of this information is still fragmentary and not all of it is widely available because of proprietary limitations. Discussions have been going on for some time, both in the Community and in OECD, with a view to providing a more comprehensive flow of information. In particular, a feasibility study has been carried out for a European Reliability Data System.

4.1 The Need for a Central Service

We believe that there is a valuable function to be provided by a central service run by the Community. Such a service would provide access to a wide range of national data banks, but we think it should not attempt to duplicate these banks; rather, it should provide a central provision for interrogating the existing national systems, partly in reply to specific questions put to the service, and also on a more general basis with the aim of disseminating information about abnormal events and the reliability of components and equipment. The Commission will need to establish some degree of compatibility between national systems, particularly concerning the types of data stored and the methods of retrieval.

In giving support to the proposal, we wish to draw attention to a number of points:-

(1) It will be important to define the objectives and functions of the service with considerable clarity.

(2) The service will be worthwhile only if it is supported by an adequate number of clients. Given such support, it will be of considerable importance to the Community and should not necessarily be required to find all its funds from commercial fees.

(3) To be successful, the service will need to be more than a simple information service. It will need to have experienced professional staff who can solve the classification problems inherent in this kind of work, who can advise customers, and who can also provide a regular outward flow of information.

(4) The service will need a close collaboration with the electricity generating industry, possibly through a formal link with UNIPEDE.

(5) In addition, utilities operating nuclear power plants should employ technical staff, fully abreast of developments in the nuclear power field, and capable of making full use of the service.

4.2 Recommendations

1. A common form for reporting abnormal events should be agreed upon between the Commission and the Member States.

2 The Commmission should view seriously the results of the feasibility study for a European Reliability Data System and take into account the views of the Advisory Committee on Programme Management, Reactor Safety, which supports the proposition. If the project meets the criteria indicated above, we recommend that it should be established.

CHAPTER 5

RADIATION PROTECTION ASPECTS OF THE SITING OF NUCLEAR REACTORS

The choice of a reactor site depends on a large number of characteristics, the predominating ones of which are those of engineering and radiation protection. For engineering reasons, the site must have suitable foundations, an adequate area of land, convenient access, and an adequate supply of cooling water. The radiation protection factors include the ease of applying counter-measures after an accident, the minimising of the consequences of an accident, and the provisions for the routine release of radioactive wastes. In addition, it is desirable that the site should be free of such disadvantageous features as a liability to flood and a likelihood of significant earthquakes. Other aspects include such features as the commercial availability of the site, the availability of labour for construction and operation, proximity to the principal electrical loads, and the reliability of the connections to the power grid. Finally, it must be remembered that the views of the local population are an essential factor in the selection of any site. Acceptance criteria for the local population, however, are so multi-faceted, and vary so strongly throughout the Community and with time, that their discussion would be beyond the scope of this report.

This report deals only with the radiation protection aspects of siting and, of these, only with the effects of accidents. Given the adequate provision of cooling water, the routine disposal of radioactive waste from nuclear reactor sites can be achieved in ways which do not noticeably change the pre-existing natural background level of radiation.

5.1 General Issues

Accidents to nuclear reactors can have a wide range of consequences and there has been a natural tendency to give priority to the reduction of both the likelihood and the consequences of serious accidents. It is thus to be expected that there will be a relationship between the severity of an accident and the probability of its occurrence, with the worst accidents being less probable. This tendency has not been incorporated formally into licencing arrangements: it has been found more useful to use it as a design objective, in the form of a quantitative relationship between scale and probability. The first of such relationships was that proposed by Farmer(1), where the magnitude of the accident was expressed as the activity of the nuclide iodine 131 released to the atmosphere. This is one of the more important materials in the case of an uncontained accident and can be regarded as representative of a number of volatile fission products.

There are several different approaches that can be adopted to assess the influence that the choice of site might have on the consequences of accidents. All these approaches require the postulation that very severe accidents are possible. Reactor accidents are, in any event, rare and most of them would have such small consequences that they do not influence siting considerations. It is sufficient to concentrate on three possible aspects. The first of these is the long-term effect on health from a single specified accident, or from a probability distribution of accidents. The principal long-term effects to be expected are possible additional cases of cancer and, in smaller numbers, of serious genetic defects in the next few generations. With the conventional, and probably conservative, assumption of a linear dose-effect relationship without threshold, a measure of all these effects is given by the estimation of the collective dose equivalent, or, for those accidents which do not release significant amounts of alpha-emitting materials, ie for the great majority of accidents, the collective absorbed dose.

For many accidents, the possible long-term effects are the only significant health effects. However, for large accidents and near-in populations, the organ doses may be large enough to cause short-term health effects, such as acute radiation damage to the thyroid or lungs, or the whole-body doses may be large enough to cause radiation sickness and some fatalities. The second factor to be considered is then the number of people whose absorbed doses are likely to reach the levels capable of causing serious early effects. The collective absorbed dose is no longer relevant.

Thirdly, there is the consideration of counter-measures. Some protection of the population can be provided by counter-measures such as evacuation, the administration of stable iodine to provide protection against effects of the radioisotopes of iodine and, on a longer time-scale, the prevention of the normal distribution and consumption of foodstuffs grown in the locality. The choice of site may influence the feasibility of putting these counter-measures into effect and, in particular, may influence the numbers of people likely to be involved in urgent counter-measures, such as evacuation or the issue of stable iodine.

These counter-measures, if effectively applied, will result in a substantial decrease in collective and individual doses. However, they may also have a significant deleterious effect on those involved. For example, considerable human misery results from any evacuation of which the duration is uncertain. The number of people subjected to counter-measures in the event of an accident is influenced by the choice of site and is, therefore, the third factor to be considered.

The consequences of persistent contamination of land, homes and industrial installations may well prove to be among the most severe consequences of a serious accident to a nuclear reactor. The influence of this problem on the choice of a site is not simple and cannot be reduced to a simple quantity, such as the number of people involved or the level of dose.

Clearly, the relationship between these three factors and the population distribution at the site will be complex, and the comparisons between one site and another are not likely to be the same for the separate factors. In particular, estimates of the long-term health effects are likely to be significantly influenced by small doses to a large number of people at great distances, while the possibility of counter-measures and, more importantly, of early health effects, will put emphasis on the number of people close to this site. The final decisions as to the choices between sites will thus depend on the importance attached to these various factors, to the engineering features of the reactors, and to the non-quantitative features of the site and its surroundings.

5.2 Simplified Comparisions

In order to illustrate the inter-relationship between the scale of possible accidents and the choice of a site, simplified calculations have been carried out using a standard mixture of radionuclides in the source term and a simplified meteorological and dosimetric model. These calculations were not in any way intended to replace site specific calculations, nor were they used to evaluate the absolute magnitude of the possible consequences of an accident. They merely made it possible to see how the different siting factors discussed above might influence the order in which sites were selected. They also allowed the effects of different accident distributions and of different lower limits on the integration of collective dose to be demonstrated.

The calculations have been carried out for four European reactor sites and for two hypothetical sites. Of the four real sites, two are rural and two are more heavily populated. Most of the calculations relate to the population in the average sector round the site, but for two sites more detailed data have been used to compare the most highly populated sectors with the average. The two hypothetical sites are near and within a major urban area.

Although all these calculations have been carried out by a simplified method using typical weather conditions and, usually, nominal population distributions, the results are not inconsistent with those of more detailed site-specific calculations. The use of bad weather conditions and specific population distributions in particular directions will change the absolute magnitude of the consequences of an accident but will have little effect on the comparison between sites unless there are significant site-specific combinations of weather conditions and population distribution. The calculations in the Rasmussen report[2] and the German risk study[3] take account of the expected effect of counter-measures and are thus not directly comparable with those used here.

The results have been used to place the six sites in an order of merit, depending on the factors discussed above and then to calculate the ratios of the selected quantity, eg collective absorbed dose, at the "best" site and each of the other sites. This ratio has been called the site ratio.

5.2.1 Site Ratios Based on Collective Absorbed Dose

For accidents releasing up to about 1% of the volatile fission products in the core of a reactor with an electrical output of 1200 MW, the site ratios range up to about 10 for all the accident distributions considered. This range is reduced if larger accidents are included and if small doses at large distances are included in the calculation of collective absorbed dose. Absorbed doses below a selected limit, or threshold, have been excluded from the calculation of collective absorbed dose.

The use of individual sector populations for Transfynydd and Heysham changes the collective absorbed dose by no more than about a factor of 2 for a threshold of 0.3 rad.

Similar calculations have been carried out on several other European sites and the results are intermediate between those of the sites studied here.

5.2.2 Site Ratios Based on the Number of People Suffering Early Health Effects

For a release of 1% of the volatile fission products, early health effects are not likely to occur at ranges beyond about 2 km in average weather conditions or 10 km in adverse weather. Site ratios for real sites based on the number of people in the mean sector range up to about 20 (for 2 km) and about 6 (for 10 km). The figures at 2 km relate only to residents, and local transient populations may also be important.

5.2.3 Site Ratios Based on the Number of People Affected by Counter-measures

Urgent counter-measures, such as evacuation and the issue of stable iodine, will be considered seriously out to distances of perhaps 20 km in severe accidents, although the level of risk between 10 and 20 km is likely to be small. Site ratios based on the population out to 20 km are thus of some interest. For the average sectors they range up to about 15.

5.2.4 The Effect of the Worst Sector

The use of the worst sector increases the number of people within the relevant distances, by a factor of up to about 10, but has little effect on the site ratios.

5.3 Existing Siting Policies

Site selection in all countries takes account in various ways of all the relevant features of the site and its surroundings. In some countries, numerical criteria are used to assess the suitability from the point of view of radiation protection of the various sites that are otherwise feasible. In other countries, the radiation protection features, in common with most other features, are dealt with non-quantitatively. All these aspects of siting policy are under review in Europe and in the United States and since the European review is not yet complete and only tentative proposals have appeared in the US, we have not thought it right to attempt any comment on existing siting policies or on their possible development.

5.4 The Effect of Multi-Reactor Sites

Many sites have two or four reactors and there have been proposals for large nuclear parks containing many reactors and possibly including fuel fabrication and reprocessing plants. Although reactors and plants on such sites would be subject to common-mode failures initiated by those external events that affect the entire site, e.g. earthquakes or floods, sites subject to such events could be avoided, or the individual plants provided with adequate protection. In addition, the protection systems of such plants can be such as to make it highly unlikely that an accident occurring at one plant would affect the safe operation or shut-down of other plants on the same site. Thus there seems no reason to assume that the magnitude of accidental releases would be altered by grouping the plants together.

By contrast, the overall probability of an accident on the site is increased as the number of plants is increased. The simplest approach is simply to add the probabilities for each reactor and plant. This is mathematically acceptable since all the probabilities are small. However, this approach ignores any contribution from common-mode failures and any benefit from a strong site management.

In practice, the presence of two or four reactors on a site does not significantly alter the siting assessments and is likely to have management advantages. The concept of a nuclear park offers further advantages in relation, for example, to physical protection, waste storage, shipping and disposal, fuel movements, and possibly regional planning. In practice, the siting of nuclear parks will be decided by such considerations and by those of engineering and economics rather than by the radiation protection aspects exclusively considered here.

5.5 Conclusions

The quantitative effect of site selection in the states of the European Community is not as large as it would be in a more sparsely populated area. For the number of long-delayed health effects, the ratio between sites is likely to be no more than 10. For the number of early health effects, which will occur only after very severe accidents, or for the number of people affected by counter-measures, the factor between sites may be somewhat greater, up to about 15.

Site slection is at its most effective in influencing the consequences of accidents of a moderate severity. Some of the consequences of very serious accidents will extend to considerable distances where the differences between sites is not great. Since these serious accidents are also likely to be the most rare, their importance in site selection is not great. The choice of sites is thus principally influenced by the moderate scale of accidents which affects only the near-in population and which gives emphasis to the importance of a short-range low-population zone for which emergency plans can be designed to be highly effective.

5.6 Recommendations

1. Siting policy and practice is predominantly a question for Member States, but some reactor sites are near to state boundaries. We therefore recommend that the Commission should arrange for discussions between Member States with the aim of encouraging a consistent underlying approach. It is also important that there should be discussion between Member States when it is proposed to site a reactor in the vicinity of a state boundary.

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CHAPTER 6

EMERGENCY PLANS

Many different kinds of accidents of different degrees of severity can occur on a nuclear site. Such accidents may range from minor plant faults or minor incidents involving radioactivity or radiation exposure, through serious failures causing major plant damage or serious exposures of workers, up to accidents causing major damage to plant and releases of radioactivity off-site. The emergency plans must be able to deal with all these situations. They must be designed to limit the damage to the plant and to provide protection for the workers on site and the surrounding public.

6.1 Basic Functions of Emergency Plans

The following distinct features of emergency services can be identified:-

(1) the provision of high quality specialist expertise in support of the plant management.

(2) the safe shut-down of the affected plant, continued heat removal, and the continued safe operation of the rest of the site;

(3) damage control, rescue, fire-fighting;

(4) radiation protection on-site;

(5) evaluation of the likely course of events and the prediction of radiation doses off-site;

(6) initiation and operation of counter-measures.

On a longer time scale

(7) adjustment and final withdrawal of counter-measures

(8) provision of data for the retrospective assessment of health consequences;

(9) provision of data for scientific and engineering studies.

Of the first six of these functions, all but the first involve detailed information and executive action on site, and must be the direct responsibility of the operating management, supplemented by specialised help (Item 1) as soon as possible, and by local services where early off-site action is required. As the situation develops, additional resources will become available and the responsibility for off-site action may be transferred to other authorities. Such transfers must always be formal and unequivocal. On site, the senior operating management will progressively take over from those initially in charge, but Headquarters staff should act only as advisers unless they formally relieve the site management of their normal function. The responsibilities and lines of command, together with the procedures for varying them, must be clearly set out in the emergency plans.

Items (7), (8) and (9) will usually be collaborative responsibilities, but the emergency plans should include the initiation of these functions and there should be arrangements for ensuring that they are carried through to a conclusion. The information problems of emergencies and the need for good communication arrangements are dealt with in Chapter 7.

6.2 The Need for Multiple Control Centres

Practical experience of serious accidents, from the reactor fire at Windscale in 1957 to the accident at Three Mile Island, has emphasised the need for more than one control centre and for the clear demarcation of control centre functions. Control centre staff have to deal with the receipt and analysis of incoming data, the executive conduct of operations, and the transmission of information to other centres and authorities. The public, the press, national and local authorities with (or sometimes without) relevant responsibilities, and political figures will all be attempting to extract information from those concerned with the accident. A system of multiple control centres can structure these requests and protect the vital operational functions from excessive external interference. (See also Chapter 7).

No single structure of control centres has yet emerged as being generally preferred, but it is recommended that a choice should be made using the following structure as a starting point. The operating management will need control centres, possibly, but not necessarily, in separate locations, for the following activities:-

(1) plant operations;

(2) emergency site operations;

(3) on-site radiation protection;

(4) off-site radiation protection including monitoring and the control of the initial counter-measures;

(5) headquarters control and information functions (at a centre preferably located near, but not at, the affected site).

The detailed delineation of these activities will be closely related to the structure of the operating line management.

Activities 4 and 5 above are major interfaces between the operating utility and the outside world. In addition, there will always be several regulatory authorities and national advisory bodies closely associated with a serious accident on a nuclear site. These, and other organisations providing support, or making measurements, should be linked into a coherent system of control centres and should refrain from operating independently.

For this network of control centres to be effective, there must be a well developed and rehearsed system of communication. Telephone and radio may well be essential, but important information and numerical data should be transmitted, at least in confirmation, by systems producing hard copy. These communication systems should be secure against overloading by unofficial uses, for example, by the media.

6.3 Counter-measures

One of the problems facing an incident controller is that of deciding whether to initiate counter-measures to protect members of the public, and if so, over what area. Counter-measures may include evacuation, the use of stable iodine to reduce the effects of radioisotopes of iodine, and the control of foodstuffs, especially milk. Counter-measures are indicated if the levels of dose would otherwise be serious, and if they are likely to be effective in reducing doses. In principle, it is the magnitude of the dose reduction that should be critical, but in practice, emphasis is given to the level of dose that would be received in the absence of counter-measures. There is then an implicit assumption that counter-measures, if applied, will be effective.

The greatest difficulty in making decisions about counter-measures is posed by the need to forecast the course of an accident and thus to estimate doses and dose reductions from situations that have not yet arisen. For this reason, emergency plans should include arrangements for the initiation of the first phase of counter-measures in terms of plant conditions, as well as in terms of measured releases of activity or environmental measurements.

Once the need for counter-measures has been established, it is necessary to define the area over which they should be applied. Unless there are obvious geographical factors, such as rivers, the outer limit of the area will be somewhat arbitrary and may give rise to anxiety. As the scale of counter-measures increases, so does the complexity of the measures themselves. For example, if evacuation is to be carried out it is important that those moved should be transferred to a position at least three times as far from the source of the accident as the outer limit of the evacuated area. Similarly, incoming supplies of foodstuffs must have an origin far enough away from the accident to have only low levels of radioactive contamination.

In making plans in advance, and in taking decisions at the time of an accident, it is very desirable to have quantitative guidance on the initiation and scale of counter-measures. Several countries have adopted quantitative values of absorbed dose, or of concentrations in foodstuffs or air, above which counter-measures should be very seriously considered, and below which counter-measures are not likely to be justified, unless they are easily applied and of little detrimental impact. In Britain, these values have been called emergency reference levels, and in the United States of America, protective action guides. In both cases they relate to the levels of dose that are expected to occur in the absence of counter-measures.

It is important to note that the emergency reference levels now in use are well below the levels of dose that might cause acute health effects. They correspond to a risk of late effects, notably death from cancer after a delay of some decades, currently thought to be in the region of one chance in a thousand to one chance in ten thousand, spread over about thirty years. Members of the public who have not been subject to counter-measures, because their doses were below the relevant emergency reference level, need to be reassured that they have not thereby been exposed to substantial risks.

The effectiveness of counter-measures will depend partly on pre-planning and partly on improvisation. Since some counter-measures, notably those involving farm produce, may extend to tens or even hundreds of kilometres, it is necessary to establish the scale of the largest accident for which the plans are intended to be effective. More severe accidents cannot be excluded, and will have to be dealt with by improvisation beyond the planned arrangements. It is apparent that the plant safety assessment, the emergency plans and the site characteristics should all be considered together as part of the licensing process.

Finally, we consider the effectiveness of counter-measures to be heavily dependent upon the rational and disiplined behaviour of the local population. This, and the reassurance of those not subjected to counter-measures, will not be achieved unless the basis for emergency plans is well understood by local communities or, at least, by their representatives and officials, and unless there is local trust in the competence and honesty of the local organisation.

6.4 Local Emergency Organisation

The emergency organisation concerned with the protection of the public must have the confidence of the local community. It has two principal functions - to provide information and to provide counter-measures. Both of these functions depend critically on a knowledge and understanding of the course of the accident and in this respect at least, the site management has a major part to play. Local and regional elements of government will have their own plans for dealing with emergencies, and it is essential that the arrangements for dealing with a nuclear accident should be closely integrated into these more conventional systems and, through them, with other community activities.

Particular problems are inherent in the movement of special groups such as school children and hospital patients. Suitable plans, enlisting the support of teachers and of medical and nursing staffs, should be made for dealing with these groups. Difficulties will, however, remain at certain times of day when members of families may be neither at home nor in clearly defined locations like schools.

There is a considerable and widespread experience of practical evacuations, e.g. in relation to releases of toxic chemicals such as chlorine, and this experience should be used in setting up evacuation plans. Conversely, the Community should also encourage Member States to make use of the work on nuclear accidents in reviewing other emergencies arrangements.

One major function of the planning of emergency arrangements is to clarify the allocation of responsibilities. The details must depend on the characteristics of the local government arrangements, but the vital importance of the experience and specialised knowledge of the site management should be fully reflected in the plan.

Once the local plans have been worked out they should be regularly exercised. Exercises are partly to provide practice and experience and partly also to give an opportunity to review and improve the procedures. These exercises of local systems should sometimes be extended to include the national arrangements, and, if appropriate, to the testing of transfrontier arrangements.

6.5 Support Services

Major nuclear accidents are too rare to justify a standing emergency team large enough to cope with all eventualities. Emergency plans must therefore include arrangements for calling in support from other nuclear installations, and from other organisations, including the armed forces. Except where an accident may call for counter-measures in a neighbouring country, there is not likely to be a need for support services from other countries, at least in the early stages of an accident. If emergency conditions persist for some time, more widespread calls for support may be necessary. Support services should, in any event, put their personnel, either individually or in defined command groups, under the command of the appropriate controller forming part of the main emergency organisation.

This use of external support will reduce the amount of equipment and supplies that need to be held in emergency stores. Nevertheless, a basic minimum stock should be provided to cover all the action, including counter-measures, for the first days at the scale needed by the largest size of accident for which plans are being made.

6.6 Long-Term Plans

Although not strictly part of emergency plans, it is necessary to make arrangements for long-term operations. The first of these will be the withdrawal of counter-measures; this will be urgent if an area has been evacuated, but may extend for several weeks in respect of agricultural produce. It will also be important to carry out scientific and engineering studies concerning the accident itself and its environmental consequences.

These studies will be helped if the national authority recognises the need for the collection and analysis of data beyond that needed for the immediate control of the emergency, and requires this need to be considered in the establishment of emergency plans.

6.7 Conclusions

There have been few occasions on which it has been necessary to apply emergency action outside of nuclear sites, and the accident at Three Mile Island showed that the plans there were inadequately developed. It is also clear that any emergency plans must form an integral part of the arrangements made to deal with non-nuclear emergencies and will thus depend heavily on the detailed organisation in the Member States. As recently as January 1980, there has been a workshop on procedural and organisational measures for accident management at Laxenburg in Austria, and it seems likely that this has fulfilled the need for international discussions for the time being. Meanwhile, some Member States of the Community are already reviewing their emergency arrangements in the light of lesssons learned from the accident at Three Mile Island and we recommend the authorities in all Member States to conduct such a review.

We have not found it easy to obtain information about the extent to which transfrontier emergency arrangements have been put into effect. The need for such arrangements has been identified in several locations by the expert group set up under Article 37 of the Euratom Treaty and the Commission has identified reactor stations near enough to national frontiers to call for such arrangements. We are not aware of any machinery for confirming that these arrangements have been made, and we recommend that the Commission should reach an agreement with Member States for an outline of the relevant arrangements to be transmitted to the Commission. This would have the advantage not only of confirming that such arrangements have been made, but also of providing a central bank of information which the Commission could use in advising Member States on the form of such arrangements in future cases.

6.8 Recommendations

1. Member States should review their emergency procedures in the light of the experience from Three Mile Island, and the Commission should publish a comparative study of these procedures.

2. Member States should ensure that their nuclear emergency plans are closely integrated with their general emergency plans, and include arrangements for regular emergency exercises.

3. Member States should ensure that their emergency plans are adequate to take care of special population groups, such as school children and hospital patients, and should also consider the effectiveness of such plans at times of day when members of families are likely to be separated.

4. Member States should make use of the experience they gain in planning for nuclear accidents in reviewing their emergency plans for other situations.

5. The Commission and Member States should set up a procedure under which Member States inform the Commission of the arrangements for transfrontier emergency plans.

CHAPTER 7

PUBLIC INFORMATION IN EMERGENCIES

The accident at Three Mile Island, besides emphasizing the need for rapid, clear and reliable public information, has also brought to the fore deficiencies in both its generation and dissemination. Both aspects are dealt with in this Chapter.

7.1 The Generation of Information and its Dissemination by the Utility

The initial generation of information is primarily a matter for the operating utility. It is therefore imperative that each utility should have the confidence of the public and should provide for the assessment of the accident information and the preparation of statements. It should designate in advance a number of official spokesmen, available at any time, and forming the principal route for releasing information on all events that may have an impact outside the utility's nuclear plants. In addition to being thoroughly familiar with plant design and operation, the latter preferably based on knowledge gained in a position of responsibility, these spokesmen should have training in presenting information to the public. Emergency exercises should be used to give them experience, which should include questioning by people with experience as news media representatives.

7.2 The Press Centre

Arrangements should be made in advance for a press centre in direct communication with the site to be available either by the utility or by the government agency responsible for emergency measures. This press centre should be sufficiently large to accomodate an adequate number of reporters and should be properly equipped, notably with communications, visual aids and reference materials selected in advance for the purpose of illustrating events on site for the layman. The requirements for size and general facilities of the press centre should be based on previous experience obtained in the Member States with national and international coverage of emergency events. Staffing of the press centre should be the joint responsibility of the utility and the national safety authority.

7.3 The Dissemination of Information and Instructions by Government Agencies

In the dissemination of information, a distinction should be made according to the intended destination. Instructions to the public in the vicinity of the plant should be given by responsible government spokesmen, using local means arranged in advance for such emergencies. All other official information should go through the Press Centre or the government agencies' normal outlets to the media. Officials presenting information to the public should be trained in this function and should have adequate experience in the relevant technical subjects.

Because many government departments and agencies will be involved, it is important that an unequivocal division of responsibilities in the field of public information be agreed upon in advance between the utilities and these government agencies, and that a lead agency should be designated. It is also important that the arrangements should be such as to encourage consistency, based on shared factual knowledge, in public statements from different organisations. One way of achieving this is to set up a common information centre.

Member States should encourage their national media to hire and train staff capable of understanding the main aspects of nuclear power plant behaviour and radiation releases. These reporters should in turn be invited by the utilities to visit nuclear power plants and should become acquainted with the utility spokesmen and the representatives of the government agencies.

7.4 Transfrontier Problems

While the subject of accidents in nuclear power stations adjacent to a national border is dealt with in Chapters 6 and 9,it is emphasized here that relevant agreements between the neighbouring states should include adequate arrangements for informing and instructing the population on both sides of the frontier in the vicinity of the plant. Where the same language is spoken on both sides of the border, care is needed in identifying the population to whom instructions are being given and in specifying the source of those instructions.

In addition to our view stated in Chapter 6 on the Community's role in promoting transfrontier agreements, we believe that the European Community should be ready to provide technical assistance to news media, particularly to local news networks that are likely to disseminate emergency information across the borders between Member States.

7.5 Recommendations

1. The national agencies of the Member States and the utilities should review their practices in the light of the comments and suggestions made in this Chapter.

2. The news media should examine the quality and training of the staff they would be likely to use following a serious nuclear accident and should overhaul their links with the utilities and the national agencies.

3. The Commission should encourage Member States to require the introduction of formal local liaison arrangements, especially where these arrangements need to cross national frontiers.

4. The Commission should consider ways in which it could provide technical help in advance of any accident, to news media, particularly to local news networks that are likely to disseminate emergency information across national frontiers.

CHAPTER 8

THE MANAGEMENT OF THE RESEARCH PROGRAMMES OF THE COMMUNITY

8.1 The Rationale of Community Research

The individual Member States all have research programmes in the fields of nuclear safety and health protection, and the Community operates direct action programmes within the Joint Research Centre and indirect programmes by means of research contracts placed mainly within the Member States.

There are several reasons for initiating and maintaining a community programme of research of which the following are important examples:

Political It is desirable to have a Community programme of research for institutional reasons. Such a programme is evidence of the solidarity of Member States and indicates a common objective on the part of the Community.

Common Requirements The existence of common requirements opens the door to common programmes and the reduction of duplication.

Sharing of Cost Major projects may be too expensive for any single Member State and the Community can provide facilities for a multinational project.

Sharing of Information and Resources A Community programme has the advantage of ensuring an equitable distribution of the information between the Member States. It also helps to group small research units which might not be viable separately. For smaller Member States these may be predominant reasons for supporting a Community programme.

Co-ordination A Community programme can be designed to avoid major gaps and minimise overlapping between programme items.

These features combine to make a Community research programme desirable and indeed essential. It is, in fact, the first of the Community objectives in Article 2 of the Euratom Treaty. In this respect, it is the political objectives that are predominant.

Common requirements alone provide only partial justification for common programmes, and most transnational projects need justifying on grounds under one of the other headings. The arguments on cost sharing need to be examined critically, and apply principally to major projects like JET. On a smaller scale, international projects are usually less efficient and they tend to be more expensive than separate national ones, unless the latter lead to excessive duplication. Information sharing could be, and to a large extent is, effective between national programmes. Co-ordination and grouping of small projects is not easy to achieve without control of the funds in the Member States. Overlap can be controlled within the Community programme, but it is very difficult to influence overlaps between national programmes. In principle, a Community programme can avoid gaps by commissioning work which would not otherwise be done. On the other hand, it can be argued that a programme which has not been adopted by any single Member State is not likely to be worth initiating at the Community level.

In conclusion, the main basis for a Community research programme is political and institutional, except for major projects which are too expensive to be conducted nationally. In addition, the smaller Member States get information more cheaply and more effectively than they could in the absence of a Community programme. It seems likely, however, that all Member States, including the smaller ones, regard their own national programmes as being of more importance than those of the Community collectively. Nevertheless, the

the combined national and Community programmes play a very important part in the achievement of a high standard of safety and it is important that they should be well co-ordinated, but at the same time sufficiently flexible, to meet the demands of changing situations.

8.2 The Community Machinery for Establishing and Monitoring Research Programmes

The Community research programme is intended to be an applied programme with strictly defined objectives. The following account refers to the programme in reactor safety and health protection, but much of the material applies more generally.

Because the Joint Research Centre has no direct responsibility in the practical issues of nuclear power and radiation protection, it is essential for it to have close relationships with operating organisations in Member States and for the Member States to participate effectively in the establishment of the research programme. At the same time it is also necessary for the Joint Research Centre to have full responsibility for the management of its own affairs and to be fully accountable to the Commission and thence to the Council. Similar considerations apply to the management of the indirect programme. It is in the context of these two broad requirements that we have examined the Community's system for managing the research programmes.

8.2.1 The Initiation of Programmes

After extensive consultation within the Commission, the Director General of the Joint Research Centre prepares a proposed programme. This programme is discussed at three senior consultative levels -

(1) The General Advisory Committee (GAC). This advises the JRC on all aspects of the programme.

(2) The Scientific and Technical Committee (STC). This advises the Commission on nuclear matters.

(3) The Committee on Scientific and Technical Research (CREST). This deals with both direct and indirect action programmes and advises both the Commission and the Council on the overall orientation of the programmes.

These three bodies operate independently and do not always give consistent advice. The GAC may also consult a number of more junior committees known as Advisory Committees on Programmes Management - ACPM - which are concerned more specifically with the programmes once they have been approved.

Following this consultation, the Commission proposes a programme to the Council. At this stage, opinions are sought from the Economic and Social Committee and the European Assembly. The Council operates with its usual structure of the Atomic Questions Group and the Committee of Permanent Representatives. Eventually, a Council decision settles the budget for the programme and its major components, on the basis of a four-year rolling programme.

8.2.2 The Management of Programmes

Advice on the continuing management of programmes is given by the Advisory Committees on Programme Management. These usually consist of three members from each Member State, and three from the JRC or from other parts of the Commission - a total of thirty.

These ACPMs report to both the Commission and the Council and, on request from the GAC, advise the GAC on new programme items, sending copies of their advice to the Commission and the Council. Where relevant, they deal with both direct and indirect action programmes.

There are five ACPMs in the fields of nuclear safety and health protection.

These are:-

ACPM, Reactor Safety
ACPM, Management and Storage of Radioactive Waste
ACPM, Plutonium Fuel and Actinide Research
ACPM, Decommissioning of Nuclear Power Plants
ACPM, Biology and Health Protection (Radiation Protection).

We have considered the working methods of the ACPM Reactor Safety and the ACPM Biology and Health Protection. The financial scale of the programmes on which the ACPMs advise is now about 80 MEUA.

The ACPM, Reactor Safety, has chosen to deal with the programme in great detail - more detail than can be accommodated by the expertise of its members. To remedy this deficiency, the ACPM has had to proliferate a large number of working groups (ten at present) made up of a dozen or so members each, appointed by the ACPM. These working groups are, in practice, permanent committees advisory to the ACPM. In addition, some working groups are split into sub-groups and further ad hoc groups are created on a temporary basis to discuss specific topics. Due to the pre-existence of other harmonisation and co-ordination committees dealing with liquid metal fast breeder reactors and with light water reactors, some of the working groups have a double role.

This ACPM normally meets three times a year, while the various working groups meet two or three times a year. Including sub-groups and ad hoc groups, the whole system requires something like thirty meetings per year. The overall attendance time, excluding travel and Commission staff, is several thousand man hours per year. The ACPM and the working groups have required detailed and extensive supporting documents and the Director General of the JRC estimates the commitment of research staff as in excess of 20 man years per year.

By contrast, the ACPM, Biology and Health Protection, operates without working groups. It deals with an indirect programme and its members are drawn largely from institutions which are potential contractors. They are thus expert in the relevant fields, but not completely disinterested. It has been successful in establishing and maintaining a realistic programme, but has been disinclined to recommend the substantial reduction in total budget that some of its members believe to be appropriate.

Neither of these ACPMs provides an input of information from the Member States on their research programmes, as required by the Council resolution of 18 July 1977. This resolution included among the tasks of each ACPM, ensuring "better liaison between implementation of the programmes at Community level and the corresponding research and development work being carried out in Member States".

8.3 The Views of the Expert Group on Nuclear Safety

Nuclear safety comprises only a small part of the work of the three senior committees, GAC, STC and CREST, and we need make no comment on the inter-relationships. Nor do we find it necessary to comment on the ACPM, Biology and Health Protection. By contrast we strongly criticise the operation of the ACPM, Reactor Safety. We have not attempted to find out how the present situation developed and we do not wish to be critical of the members of the Committee and its working groups - given the requirements which they judged to have been placed on them, they had little choice.

It is apparent, however, that there is a significant lack of understanding of each other's problems between the ACPM and the Commission. The Commission in the form of the JRC, sees the ACPM as being a very influential body which must be provided with the detailed information it seeks; the ACPM, or at least some of its members, see their efforts frustrated by inadequate or unsuitable documentation and regard their recommendations as having little influence on the Commission.

The combined effect of a complex committee structure and some confusion or disagreement about objectives and methods of work has been to impair sound management and to leave both the the JRC management and the Member States with no clear lines of accountability and a mounting sense of frustration.

Despite these difficulties, the working parties have one incidental advantage in that they provide for a useful and stimulating exchange of views between individual scientists and engineers in the Member States and the staff of the JRC. If the working groups are disbanded, some attempt should be made to ensure that adequate personal links are maintained, and to see that the experience in the Member States is still available to the JRC.

8.4 A possible alternative Method of Management of the Research Programme in Reactor Safety

We have considered an alternative system of linking Member States and the JRC to meet the needs set out at the beginning of this chapter. The system is related to reactor safety but may have relevance in other programme areas.

The JRC produces a six-monthly technical progress report on all projects and is starting a regular report on the resources applied to each project. There is also a full technical report at the end of each definitive phase of a project and at final completion. We are satisfied that these documents provide sufficient information for Member States to make comments and give general guidance on the programmes as they proceed.

The ACPM should therefore meet after the publication of each six-monthly progress report. The members appointed by the Member States should be sufficiently senior to take a broad view of the projects and to judge how the progress is matching the original plans and objectives. It would be useful for Member States to consult the Commission before making their appointments. There should be sufficient time between the issue of the progress report and the meeting to allow members to make use of consultation networks in their own countries. The ACPM should not call for additional written information, nor should it establish sub-committees in dealing with existing programmes.

In proposing new programmes, the JRC should make a broad proposal to the GAC. This should be followed by more detailed proposals to the relevant ACPM. As with existing programmes, members of the ACPM should seek any necessary detailed briefing from their own countries. Exceptionally, and only on special projects, not on whole areas, an ACPM may need to establish a short-term ad hoc sub-group to develop views on a controversial project.

To improve the accountability of the JRC, it should report to the GAC on the results from, and resources used by, each project at the completion of each definitive stage and at final completion. It should also continue the present procedure of commenting on any point where its proposals differ from those recommended by an ACPM.

To improve the flow of information from Member States to the Commission, and particularly to the JRC, members of the ACPM should arrange for the preparation of summary reviews of the main objectives and programme items of research programmes in their countries. Such reviews would not be needed more often than annually - biennially may be sufficient.

Finally, we would like to draw attention to the problem of research needs arising unexpectedly. Because of constitutional constraints, the JRC cannot react rapidly to changing needs and should therefore be concerned mainly with long-term problems. We believe, however, that some short-term capacity would be valuable, and that the Commission should introduce a mechanism for establishing a contingency reserve for indirect action, and a predetermined fraction of the JRC resources for direct action, to be released or redeployed for urgent work on the authority of the Commission following a favourable opinion of the STC. The other consultative bodies would be informed, but not consulted in advance.

8.5 Content of the Research Programme in Reactor Safety

We have not attempted an evaluation of the present (1980/1983) research programme in reactor safety. However, we did note with approval that it represents nearly 30% of the total CEC research budget. We also noted that about 8% of the reactor safety budget has been set aside for the second phase of the "Super SARA" project, exclusively devoted to in-reactor LOCA studies, and that significant research activities are under way in the fields of fuel-coolant interaction under accident conditions and the cooling of molten core debris. While endorsing such studies we point out the need to emphasise, in the light of the two events at Three Mile Island, the relative importance of small loss of coolant accidents and of insufficient core cooling with partial damage to the core over whole core melt-down studies (for LWRs). It is self-evident that such shifts in emphasis away from large loss of coolant accidents and complete core melt-down must be attuned to similar trends in the research programmes of Member States in order to be complementary rather than overlapping.

8.6 Recommendations

1. The present system of budgeting on a four-year rolling programme should be continued.

2. The ACPM, Reactor Safety, should be reconstituted without sub-groups. Members states should reconsider their representation in the light of the necessary specialist knowledge, preferably in consultation with the Commission.

3. The ACPM should normally meet only six-monthly to review the six-monthly progress reports and final project reports.

4. The JRC should report to the GAC at the completion of each definitive stage of a project, and at final completion, showing results and resources used.

5. Members of the ACPM should provide regular summaries of the objectives and projects of the relevant programmes in their countries.

6. The Commission should establish contingency plans so that the JRC can respond on a limited scale to important, urgent new research requirements.

7. The programme of the JRC should take account of the importance of small loss-of-coolant events and insufficient core cooling with partial damage to the core.

CHAPTER 9

INSTITUTIONAL ARRANGEMENTS

In dealing with individual topics we have at times referred to institutional arrangements, but there are also some general remarks which we would like to make.

9.1 Committee Organisation

The characteristic which is most obvious to a person on first experiencing the working of the Community is the predilection to establish committees. An organisation such as the Community, built up from sovereign Member States, certainly has to use a widespread and complex network of committees to establish consensus views. This procedure is clearly essential at the level of the Council and its infrastructure, but it is also a notable feature of the way in which the Commission works. Since the members of committees established by the Commission are, in general, not delegates of Member States, but experts operating in their own right, the justification for a complex committee structure in which Member States are given carefully balanced numerical membership is less obvious. A consensus decision at such a committee provides no guarantee of a similar consensus of national delegates, and the size of the committee may well make discussions prolonged and ineffective.

In addition to the problem posed by the structure of committees, there are difficulties posed by their sheer number. For a committee, particularly a large committee, to be effective, it must be serviced by a substantial secretariat. Our own group has been well served in this respect, partly because we have been fortunate in our secretary, but also because we have insisted on a high level of support from other parts of the Commission. Other committees of which we are aware are not so fortunate, and the quality of discussion is often poor because the documentation provided is inadequate and often available only on the day of the meeting.

We believe that improvements could be made by making more use of individual consultants or small drafting groups for the preparation of material to be submitted to committees. We recognise that this introduces the risk that the initial papers will be biassed by the personal views of an individual or small group, but we think this would be better than presenting the final committee with ill-prepared and inadquate documentation.

9.1.1 Recommendations

1. The Commission should undertake a review of its committees with the aim of reducing their number and their size.

2. Sufficient resources should be allocated to the remaining committees to ensure that adequate documentation is available for their meetings.

3. Greater use should be made of small informal working groups and individual consultants in the preparation of committee documents.

4. Greater use should be made of the remaining committees, particularly the Scientific and Technical Committee, for providing the Commission with opinions on topics which require a higher degree of expertise than can be commanded by the Commission's staff.

9.2 The Expert Groups set up under Chapter III of the Euratom Treaty

Chapter III of the Euratom Treaty establishes a multidisciplinary group of experts appointed by the Scientific and Technical Committee from nominations made by Member States, with the function of advising the Commission on a number of topics, of which the preparation of basic safety standards for ionising radiations is probably the most important. This function is set out in Article 31 of the Treaty.

In Article 37, Member States are required to provide the Commission with information about plans for the disposal of radioactive waste, so that the Commission may determine whether such waste is liable to result in the radioactive contamination of another Member State. The Commission is then required to consult the group of experts referred to in Article 31. In practice the objectives of these two Articles are sufficiently different for the Commission and the Scientific and Technical Committee to have chosen to appoint two separate groups to fulfil the distinct functions. The second group has become known as the Article 37 Group.

9.2.1 The Article 31 Group

This group meets about every 6 months and its progress of work tends to be slow. Its largest single programme has been the preparation of advice to the Commission on the basic safety standards and these have posed some difficulties for the group. These difficulties were somewhat exacerbated by the accession of the three new Member States, effective on 1 January 1973. At that time, the basic safety standards, which were based on international recommendations published in 1962, were in an advanced state of revision to bring them into line with international recommendations published in 1965. The extension of the group in 1973 delayed the completion of this revision, partly to take into account the views of the new members, but partly because the new Member States tended to take a different view of directives from that which had developed in the Community of six. The new Member States expected directives to be applied literally, while the original Member States were content to apply the intention rather than the literal wording. Although this interpretation was in line with the definition of a directive, the degree of administrative detail in the basic safety standards caused a great deal of discussion on the problems of applying such detailed requirements to different legislative structures.

The directive bringing the basic safety standards into line with the 1965 international recommendations was finally adopted by the Council in June 1976, but, within a year, new international recommendations were published. The Article 31 group set up a small drafting team to prepare a revised text and this was submitted by the Commission to the Council in June 1979. Despite the preliminary work, there was still not full agreement between the Member States and a technical working party of the Atomic Questions Group was needed to resolve the differences.

9.2.2 Conclusions on the Article 31 Group

The Article 31 group, with its multidisciplinary membership, provides a sound basis for giving opinions to the Commission over a wide range of topics in the field of radiation protection.

A considerable amount of time is spent in the discussion of directives because of the different attitudes to directives by Member States, and because the basic safety standards directive goes into great detail about methods of control, whereas a directive ought to be in a form which is "binding as to the results to be achieved upon each Member State to which it is addressed, but shall leave to the national authority the form and methods" (Euratom Treaty, Article 161).

9.2.3 The Article 37 Group

The Article 37 group differs from the Article 31 group in that it deals principally with specific case studies rather than with general principles.

Possibly as a result of the application of the basic safety standards, the Article 37 Group found that almost all examples of the discharges of radioactive waste from installations were small enough not to influence other Member States and they concluded that their principal effort should be devoted to the discussion of the radioactive material released from a nuclear installation in the event of an accident. This interpretation of the term "waste" has given rise to difficulties because an accidental release differs from a deliberate discharge of waste in being uncontrolled. A Member State can therefore give no guarantee about the limit of such a discharge. In practice, Member States have provided their assessment of the amount of material which would be released from certain typical accidents, but there has been little uniformity in the basis of estimating such releases. The Group has therefore been trying to establish, at least for light water reactors, a set of hypotheses for consistently evaluating the consequences of an accident. This will then provide a uniform basis for the Commission in using the material from a Member State to assess the potential radioactive contamination of another Member State. It should not be necessary for the Group to undertake any reappraisal of the safety assessments carried out by the operators and regulators in the Member States.

9.2.4 Conclusions on the Article 37 Group

If "waste" is interpreted in its conventional way, the requirements of Article 37 of the Euratom Treaty are unrealistic, because of the small discharges of radioactive waste that, in practice, take place from nuclear installations. The extension of the definition of waste to include the material released as a result of an accident has led to some difficulties of interpretation, which are now being resolved by the Group. It might help if each Member State specified the scale of release for which it required effective emergency provisions in the environment of the site within its own boundaries. The effect on other Member States of a release of this magnitude could then be assessed by the Article 37 Group and recommendations made to the Commission on the need for a study of the effectiveness of transfrontier arrangements.

9.2.5 Recommendations

1. Further directives establishing basic safety standards for protection against ionising radiation should be expressed in more general terms indicating the primary objectives and standards to be achieved, but omitting the detailed administrative requirements that make up much of the present directive.

2. The Article 37 Group should deal with the relationship between a specified release of radioactive material to the environment and the resulting radiation doses in nearby Member States. They should not attempt to reappraise national safety assessments, but should require each Member State to certify that the magnitude of the forecast release reported to the Commission is the same as that used for assessing emergency procedures within the State's own boundaries.

9.3 The Separation of Promotional and Regulatory Activities

In most countries, both in the Community and beyond, the role of Government in the early stages of development of nuclear energy was promotional, in the sense that the responsible government bodies financed, co-ordinated and carried out research and development in nuclear energy to the point where this new energy source could be taken over by industry and the electricity suppliers. The growing need for regulation and inspection was initially filled by the same bodies that had been and still were responsible for R & D and, in some cases, for demonstration plants. This was largely because of the almost total concentration of relevant expertise in these bodies. The potential danger of this dual role was perhaps first brought to the fore by American nuclear critics, who felt that their questions on the dangers of nuclear power were not given adequate attention by the USA Atomic Energy Commission. The subsequent decision to dissolve this body and form separate agencies for energy R & D (Energy Research and Development Agency) and for nuclear regulatory tasks (Nuclear Regulatory Commisssion) was followed to varying extents and in various modes by all EEC Member States. These changes reflected the growing awareness that the combination of promotional and regulatory activities within one agency would impair public confidence.

The situtation in the Commission is somewhat different, because the Commission has no direct regulatory function. Nevertheless, it does seek to influence the regulatory arrangements in Member States and would be wise to keep under review both its organisational arrangements for nuclear safety and health protection and the relationship of these arrangements with its promotional activities.

CHAPTER 10

GENERAL RECOMMENDATIONS AND CONLUSIONS

Most of our recommendations and conclusions are included in the relevant chapters of our report and the most important recommendations are summarised below. In addition, however, we have thought it right to express some general conclusions based partly on our work as a group and partly on our collective general experience.

10.1 Principal Recommendations

Our detailed recommendations are set out in the following sections of the report:

2.4; 2.5.1; 3.4; 4.2; 5.6; 6.8; 7.5; 8.6; 9.1.1; and 9.2.5.

In more general terms, we emphasise the following points:

1. The reactor at Three Mile Island was vulnerable to certain kinds of operator error. European designs are not vulnerable to the same extent. Nevertheless, the accident at Three Mile Island provided some important lessons for the designers as well as the operators of nuclear power plants, and the Commission and the Member States should review both aspects.

2. The fact that transients closely similar to that which initiated the accident at Three Mile Island had occurred and been reported earlier, but had gone unnoticed by both the US Nuclear Regulatory Commission and Metropolitan Edison, underscores the importance of the reliable transmission of significant information about relevant abnormal events between operators. That information should also be recorded in easily available user-orientated data banks for the systematic storage of abnormal events at nuclear stations. We recommend that there should be a definite role for the Commission in the establishment of such a data bank, or network of data banks, serving utilities and safety authorities throughout the Community.

3. The siting of nuclear power plants in Europe has only a limited part to play in protecting the population from the effects of accidents. Both the Commission and the Member States should work towards a consistent approach to siting, especially of installations near national boundaries.

4. Effective emergency plans and the associated supply of information to the public can achieve a significant reduction in the consequences of an accident. The accident at Three Mile Island demonstrated substantial weaknesses, some of which also exist in Europe. To reduce the weaknesses, we have made recommendation in Chapters 6 and 7 and now emphasise the following points:

   a) The Commission should publish a comparative study of the emergency procedures presently in use in the Member States.

   b) National licensing authorities should include a review of the plans defining the operating utilities' role and organisational structure during emergencies as part of the procedures preceding the granting of future operating licences.

   c) Both the Member States and the Commission should review their roles in improving the transmission of information to the public in the event of an emergency.

5. The institutional arrangements of the Community are necessarily complex. Nevertheless, the Commission should consider the extent to which it could improve its ability to respond rapidly to nuclear research needs and should also review the scale of its structure of committees and the adequacy of the technical and administrative services which it provides to committees.

10.2 General Conclusions

Like every other large scale source of useful heat, nuclear energy carries the potential to do harm and must, therefore, be treated with both care and respect. No amount of care will totally eliminate the risks of this, or any other sort of energy, but we have concluded, from our work and from our more general experience, that public health and safety would not benefit and might well suffer significantly from the replacement of nuclear energy by other readily available sources of energy.

As experience develops, additional safety measures will become available. Whenever these can be applied without unreasonable difficulty, they ought to be applied. We expect the Commission of the European Communities to play a part in developing and encouraging these additional safety measures. It will not always be practicable to apply these improvements to earlier plants, but safety is not an absolute concept, and the development of improvements for future plants does not invalidate the safety of earlier ones.

Fears are sometimes expressed about the problems posed by nuclear energy in fields other than those discussed in this report. We have in mind particularly civil liberties, international relations and some aspects of environmental protection. We do not wish to comment on these problems beyond expressing our firm belief that adequate solutions are either available or can be found, at least to the extent that the problems are specific to nuclear energy. We are finally led to the conclusion that nuclear sources should continue to play a significant part in the supply of Europe's energy.

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II

(Acts whose publication is not obligatory)

COMMISSION

COMMISSION DECISION

of 16 May 1979

relating to the setting-up of a group of high-level independent experts in the field of nuclear safety

(79/520/Euratom)

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Atomic Energy Committee,

Whereas the Commission, following an accident that occurred on 28 March 1979 in a nuclear power station situated in the United States of America, requested its staff competent in the field to provide it with a report on the causes and the consequences of that accident;

Whereas the Commission, on approving this report, considered that Community action in the field of nuclear safety, both from the standpoint of the installations themselves and that of the protection of the public and the environment, would have to be intensified and for this purpose it is advisable to entrust a select group of independent experts with the task of carrying out a general review of the present situation regarding nuclear safety within the Community,

HAS DECIDED AS FOLLOWS:

Article 1

1. A select group of independent high-level experts in the field of nuclear safety, hereinafter called the 'Group', shall be set up.

2. The members of the Group shall be appointed by the Commission in a personal capacity, it being understood that they may not belong to bodies having a direct economic interest in nuclear energy.

A senior official of the Commission may be appointed as a member of the Group. The other members appointed shall not be servants of the Communities.

Article 2

1. The task of the Group shall be to advise the Commission on all problems relating to the present situation regarding nuclear safety within the Community, including its implications where radiation protection is concerned, and to evaluate the activities conducted by Community institutions in this field for the purpose of formulating any suggestion that may serve as a basis for specific measures to be taken by the Commission. It shall forward in any case a report on its activities to the Commission before 31 December 1979.

2. The Group shall in particular:

— examine safety standards and criteria, practices and regulations in force and/or in preparation in the Member States and evaluate the procedures for Community action in progress with a view to their harmonization, including the results already established in their inventorization.

— study the procedures for a Community system of information on accidents, incidents and abnormal occurrences at nuclear power stations,

— evaluate the present application of Chapter III of the Euratom Treaty (health and safety), and in particular Article 37 thereof (release of radioactive waste),

— evaluate activities carried on hitherto with regard to the siting of nuclear power stations and the main principles of operational protection for the population (emergency plans) with a view to their strengthening at Community level,

— examine problems associated with the training of staff employed in the operation of nuclear power stations, and more specifically staff assigned to duties involving safety and health protection, both from the point of view of harmonizing practices and regulations in force in the Member States and from that of promotional activities to be pursued directly by the Commission,

— evaluate research and development programmes in the field of nuclear safety and health protection either in progress or planned in the Community in order to intensify them where appropriate in certain fields,

— provide a general overview of the manner in which nuclear safety is organized within the Community and to suggest possible institutional formulae designed to separate authorities responsible for the development of nuclear energy from those entrusted with the elaboration of regulations concerning the safety of nuclear installations.

Article 3

The term of office of the Group shall expire on 31 December 1979. It may be extended.

The list of members shall be published by the Commission in the *Official Journal of the European Communities* for information.

Article 4

The Commission shall provide secretarial services for the Group.

Article 5

Without prejudice to the provisions of Article 194 of the Treaty, the members of the Group shall be required not to reveal information which has come to their knowledge by reason of the Group's work.

Article 6

This Decision shall enter into force on the day following its publication in the *Official Journal of the European Communities.*

Done at Brussels, 16 May 1979.

For the Commission

Guido BRUNNER

Member of the Commission

II

(Acts whose publication is not obligatory)

COMMISSION

COMMISSION DECISION

of 2 October 1979

amending Decision 79/520/Euratom as regards the term of office of a group of high-level independent experts in the field of nuclear safety

(79/828/Euratom)

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Atomic Energy Community,

Having regard to Commission Decision 79/520/Euratom of 16 May 1979 relating to the setting up of a group of high-level independent experts in the field of nuclear safety (1), and in particular Article 3 thereof,

Whereas it is necessary to extend to 31 May 1980 the term of office of the group of experts set up in accordance with Article 1 of the said Decision 79/520/Euratom so as to enable the group to carry out the task thereby entrusted to it,

HAS DECIDED AS FOLLOWS:

Article 1

The term of office of the group, as specified in Article 3 of Decision 79/520/Euratom, is hereby extended to 31 May 1980.

Article 2

This Decision shall enter into force on the day following its publication in the *Official Journal of the European Communities.*

Done at Brussels, 2 October 1979.

For the Commission

Guido BRUNNER

Member of the Commission

(1) OJ No L 141, 9. 6. 1979, p. 26.