



COMMISSION OF THE EUROPEAN COMMUNITIES
JOINT RESEARCH CENTRE
Ispra Establishment
Italy

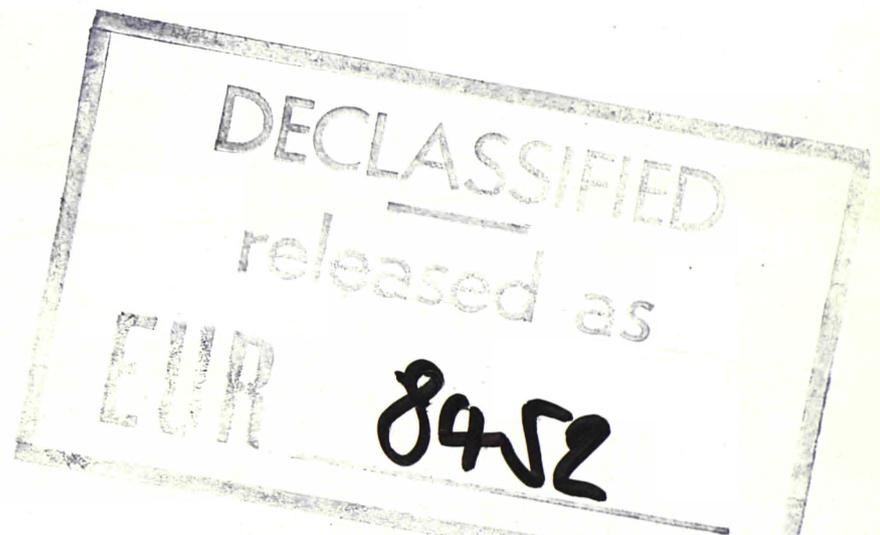
Central Bureau for Nuclear Measurements
Geel Establishment
Belgium

Petten Establishment
The Netherlands

European Institute for Transuranium Elements
Karlsruhe Establishment
Federal Republic of Germany

**PROGRAMME
PROGRESS
REPORT**

January - June 1981



Specific support for the Commission's sectorial activities

Informatics
Support to safeguards
Support to the Community Bureau of Reference
Training and education
Utilization of research results
Provision of scientific and technical services

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Programme Progress Report - JRC Ispra
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SERVICE AND SUPPORT ACTIVITIES
Education and Training

Abstract

During the period March-May 1981, two courses, one seminar and one educational workshop were held at JRC-Ispra within the Education and Training Programme. They dealt with radioprotection, systems analysis and plant operator training respectively, all subjects involved in the research activity of the Establishment.

An overall evaluation of the achievements of the courses is given.
The content and results of some of them are then reported in detail.

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INTRODUCTION

The "Education and Training" Programme has three main goals:

- to contribute to the dissemination of scientific and technical knowledge
- to contribute to exchanges and ties between European scientific workers
- to help satisfy the growing demand for continuing education for scientific and technical staff in scientific areas covered by the research programme of the JRC.

It is implemented by organizing at Ispra the so-called "Ispra Courses".

These consist of short courses and educational seminars designed for external participants with an academic or technical background and some scientific or professional experience. The courses should help them to specialize in a given field, or to deepen or widen their own expertise.

The needs to train specialists for developing countries, explicitly considered in the 1980-1983 programme decision, should be progressively taken into account.

Teaching is provided by both JRC scientists and external specialists invited as guest lecturers.

The Education and Training programme is provided with a manpower of 9 research-men and a specific budget allocation of 155.000 Ecu in 1981.

The registration fees paid by the participants are an additional financial resource of the programme. The 1981 Programme of Courses, announced in autumn 1980, consisted of 15 Courses, of duration 3 days to 3 weeks, in the following fields:

- | | |
|-----------------------------------|-----------|
| - Nuclear Science and Engineering | 3 courses |
| - Information and Systems Science | 2 courses |
| - Mechanical Science | 1 course |
| - Energy Systems and Technology | 4 courses |
| - Resources | 1 course |
| - Chemical Sciences and Methods | 2 courses |
| - Health Physics | 2 courses |

EXECUTIVE SUMMARY

B. Henry

1 Courses held during the reporting period*

The following courses or seminars have been held:

Health Physics/Fisica Sanitaria

- *"Fondamenti di Radioprotezione"*: Course, 10 days, (RP-A/81)
- *"Radioprotezione Fisica nelle Attività Medico Sanitarie"*: Course, 5 days, (RP-B/81)

Information and System Science

- *"The Craft of Systems Analysis"*: Course, 5 days, (SA/81)

Nuclear Science and Engineering

- *"Operator Behaviour in Adverse Stress Conditions"*: Workshop, 3 days, (OT/81)

Some relevant data on these courses are given in Table I.

* March-May 1981

Table I - Relevant Data on Ispra Courses held in March - May 1981

Course Reference	Date	New: N Repeated: R	Language	Duration (days)	Numb. of part.		Numb. of part. x days	Numb. of Lecturers		
					ext.	ext. + int.		inv.	ext.	total
RP-A/81 ⁽¹⁾	23.3-3.4	R	Italian	10	21	24	240	5	7	12
SA/81 ⁽²⁾	6-10.4.	N	English	5	10	15	75	5	2	7
OT/81 ⁽³⁾	27-29.4.	N	English	3	33(*)	33	99	1	—	1
RP-B/81 ⁽¹⁾	18-22.5.	R	Italian	5	11(**)	11	55	7	6	13

Course Coordinators: (1) A. Benco, Radioprotection Division, (2) H. Otway, Systems Analysis Division, (3) R. Misenta, Systems Analysis Division.

(*) Limited to this number.

(**) The registrations were 17 but 6 were retired just before the course.

The two Radioprotection courses were essentially repeats of courses held in previous years. They belong to a series of 4 courses given in Italian covering the whole spectrum of radioprotection theory and practice: fundamentals and applications in industrial, medical and nuclear plant environment. These courses have been organized since 1974. After a reduction in the number of registrations in the year 1978-79, there has been renewed interest in 1980 which seems to be continuing in 1981.

The Systems Analysis course was a second attempt to incorporate this "craft" in the Ispra Education programme. It must be acknowledged that it was no more successful than the first one (1979), at least as far as the number of registrations is concerned, in spite of the announced and implemented prominent collaboration of the International Institute for Applied Systems Analysis in this year's experiment. Because of this, even though it is not well understood, the need for future courses in this field should be questioned.

The Workshop on operator training was one of those few Ispra Courses where no Ispra contribution in the teaching is involved. This type of course is seen as an education service that Ispra may offer to interested bodies of the member states and is justified whenever holding the course in a central European environment may be of interest. Our guess that such conditions were fulfilled for this workshop imported from the USA appears a posteriori correct if one judges from the important participation response obtained from a large spectrum of European countries. It was necessary to refuse many registrations and a repeat of the workshop will be considered.

2 Cancellation of planned courses

Two courses planned for Spring 1981 had to be cancelled:

- the course "Design and Technology of Solar Systems for Buildings" got too few registrations (15) to make it worthwhile. The late distribution of the leaflet contributed to this result. But one should also question the present need for a European course on such a subject while so many bodies in all the Member Countries are now offering education and training at various levels on solar heating systems. The situation has evolved significantly since our first course in 1977 and the future of Ispra in this field is likely to be in more specialized courses, or in sessions designed for the training of D.C. specialists;
- the research Seminar "Multiphase Processes in LMFBR Safety Analysis" had to be cancelled due to the late withdrawal of several key guest lecturers. The number of registrations was encouraging and it has been decided to postpone it until early 1982.

3 Publication of Course Proceedings

Since the last Programme Progress report, the proceedings of the Course "Solar Thermal Power Generation" held in 1979 have been issued, edited by the Course coordinator, J. Gretz. This brings to 7 the number of Ispra Courses already published and 9 others are in preparation.

4 Specific projects for Developing Countries

The first Ispra Course designed for developing countries, in cooperation with DG VIII, will take place in October 1981 ("Managing National Energy Systems"). Its preparation is progressing satisfactorily. An internal study to determine the possible role of the JRC in remote sensing education for developing countries has been issued and is being analysed with a view to future commitments to this task. It has already been decided that the "Centre de Démonstration de Télédétection", (a group of the "Information Analysis and Processing" Division), will contribute as fully as possible to the Education Programme, and will form the focus of future Ispra Courses in this field. It is hoped that the first one will take place in 1982.

5 Mailing list for the information on the courses

Building up a bank of addresses on a minicomputer has progressed significantly. We have reached a number of 10.000 addresses (i.e. 50% of the target figure) and the new addressing system is already routinely used, replacing the previous mecanographic system.

6 Cooperation with external organizations

Some Courses reported herewith have been organized in cooperation with other organizations:

- Associazione Italiana di Radioprotezione: Courses RP-A/81, RP-B/81
- International Institute for Applied Systems Analysis (IIASA): Course SA/81.

Moreover, external cooperation is in progress for future courses, with for instance:

- Council of Europe, European Association of Remote Sensing Laboratories (EARSeL), International Institute for Aerial Survey and Earth Science (ITC).
- European Group of Fracture (EGF).
- World Health Organization (WHO).

7 Conclusions

The level of education and training activity in this reporting period has been rather moderate due to the cancellation of two planned courses and the modest number of registrations in two of the four which actually took place.

The interest in and success gained by the workshop "Operator Behaviour in Adverse Stress Conditions" is a matter for further thinking.

It confirms that the problem of improving the safety and reliability of plants with a hazard potential by a better training of operators is very relevant and thus encourages future Ispra Courses in this area.

PROJECTS

Reports on particular Courses

Fondamenti di Radioprotezione / Fundamentals of Radioprotection

RP-A/81

March 24th - April 3rd, 1981

Course Coordinator: A. Benco, Radioprotection Division

This year, this course was subdivided into two different groups of lectures.

The first group included treatment of the interaction of radiation with material, statistics and the detection of ionizing radiation, in order to give the participants the scientific basis necessary for the second group of lectures.

The second group introduced and treated the fundamental concepts of radioprotection. Specialist professors treated each particular field including the technical, managerial and legal aspects. To give a more complete survey of the present problems in radioprotection, the aspects of protection against non-ionizing radiation (lasers, microwaves etc.) were also covered as they have become important problems in recent years.

The theoretical lectures were complemented by a series of practicals to demonstrate the correct use of both portable and laboratory instruments. They were particularly appreciated by the participants. The course was followed with keen interest by all the 22 participants, and the discussions after the lectures were always interesting and lively.

The Craft of Systems Analysis

SA/81

April 6-10, 1981

Course Coordinator: H. Otway, Systems Analysis Division

This seminar was co-organized by the International Institute for Applied Systems Analysis; it was intended as an introduction to systems analysis for practicing engineers or scientists. Although it is the second systems analysis course we have offered (the first was in 1979) it was not planned as an extension of the first.

Participation. The total course enrollment was 17 people, 5 of whom were from the JRC. Two of the outside participants were unable to attend, apparently due to the transport strikes taking place at the time. The quality of the course participants was quite high and they were thus able to contribute actively to the discussion periods.

Course Structure. The course was planned to demonstrate how systems analysis is practiced as a craft activity by presenting several case studies in considerable depth, supplemented by lectures on specific craft aspects and professional issues. There were two lecturers from the JRC, one from the Commission (who had to cancel because of the strikes), three from IIASA, and two from outside. All the lectures were of good professional quality; those most stimulating to the participants were "Craft Aspects of Systems Analysis" and "Pitfalls of Analysis" (both by G. Majone), which provided a philosophical orientation, and "Systems Analysis in Practice" (P. Checkland), which introduced the concept of "soft systems" and presented results of its application in industrial consulting.

Evaluation. In general, the course was highly evaluated by the participants; all evaluations fell in the upper half of the scale, with average values around 70 to 80% of full scale. In terms of content, three participants wanted more theory, while four wanted more practical aspects: this suggests either that the course was well balanced or that "you just can't please everyone". The organizational aspects received especially high evaluations. The atmosphere of the course was good and the discussions lively,

but it is felt that, in a vague way, many participants found the whole of the course to be somewhat less than the sum of its parts.

Conclusion: on the Future of Systems Analysis Courses. The course attendance was somewhat disappointing in numerical terms, as was the attendance at the 1979 Systems Analysis Course. It is guessed that this is because this field is so broad that a course of this type is unable to "focus" in only one week. In addition, the intended audience is rather hard to identify; few people define their discipline as being "systems analysis" and many of those who do so really mean "computing problem analysis". It is also quite possible that this breadth of scope makes it rather difficult for participants to justify enrollment to their own organizations on the basis of relevance to their daily work. The breadth, and to some extent disorder, of the SA field was demonstrated in the course where it became clear that the two co-ordinators had rather different, but equally "correct", definitions of and approaches to systems analysis: one ("intensive") stemming from the operations research school and the other ("extensive") from the policy analysis school. It is suggested that any future course in the systems analysis area concentrate upon specific topics of general interest which are relevant to systems analysis (e.g. "Limitations to Analysis", or "Methods in Mathematical Modelling") rather than systems analysis.

Operator Behaviour in Adverse Stress Conditions

OT/81

April, 27-29, 1981

Course Coordinator: R. Misenta, Systems Analysis Division

The main purpose of this workshop was to give interested staff members of European organizations an opportunity to acquaint themselves with an approach to understanding and improving operator performance in high and low stress conditions.

The workshop was given by Thomas O. Sargent, Director of the Consultant Service, The Sargent Groups Inc. Hartford, Connecticut (USA).

Great interest was shown in this workshop (54 registrations). By request of the lecturer the number of participants had to be limited to 33.

It is worthy of note that 8 participants (i.e. 25%) from the previous Ispra Seminar "Training of Operating personnel for Industries with Hazard Potential: Theory and Practice", November 17-21, 1980 attended or registered for this workshop.

Participants

Of the 33 participants who attended the workshop, 26 came from EC member states and 8 from other states, mainly European. The participants were from the following fields or organizations:

- Nuclear Power Plants (NPP)	12
- NPP-manufacturers	2
- Regulating Authorities	7
- Research groups or institutes	7
- Others	5

The group "Staff members of Nuclear Power Plants" included operation engineers, operation managers and training managers. The other participants were mainly on the group leader or head of division level.

All were well prepared for this workshop.

Lectures and experimental exercises

The workshop consisted of lectures on the psychological aspects of operator behaviour, or more general human behaviour in adverse stress conditions, and of practical exercises.

The lectures dealt with the following subjects:

- Psychological aspects of human behaviour and of information processing
- The influence of high stress on human behaviour
- Tracking, the development of a mindset
- Programming and reprogramming
- Emergency management
- Groups in adverse stress

The practical exercises were mainly stress-reducing exercises.

General evaluation

The evaluation of the workshop by the participants (28 answers) gave the following results:

- the *programme* (structure, content etc.) was considered "good" or better by 24 of 28 respondents
- the *achievement* (quality of lectures and practicals, fulfilment of the programme) was considered "good" or better by 21 of 28 respondents
- the *general appreciation* of the course was classified as "good" or better by 24 of 26 respondents

The course structure (theoretical development, exercises and total duration) was considered as "balanced" by more than half of the participants. Some reserve was expressed on the "practical aspects" which were judged "balanced" by only 8, "insufficient" by 15 and "excessive" by 4 respondents. Organization and logistic aspects were also considered as "good" or better by 20 of 26 respondents.

Conclusions

The main result of the workshop was the interest of the participants in the aspects of stress, especially of high stress during incidents or accidents in nuclear power plants.

This interest is reflected by the large number of registration for the workshop, by remarks made by participants during personal conversations and by answers of the participants given in the questionnaire.

The fact that the participants came from 7 member states of the European Community and from 3 other European States (Switzerland, Finland and Sweden) shows that there is on a European scale a definite need for seminars and workshops or more generally of a place for the exchange of information about human aspects of nuclear power plant operation within the group of operation and training managers.

Radioprotezione fisica nelle attività medico-sanitarie Physical Radioprotection in medical Applications of Radiations

RP-B/81

May, 18th - 22nd, 1981

Course Coordinator: A. Benco, Radioprotection Division

The course was designed to update the practical knowledge of personnel responsible for radioprotection duties in medical environments.

16 people attended it. Some of them were already qualified experts in the physical survey of grade II radioprotection, while others were training for this work as research fellows or undergraduate students. Due to the preparation and the field of interest of the participants, emphasis was given to radioprotection in radiodiagnosis and radiotherapy using radiogenerators, and in nuclear medicine to the use of unsealed radioactive sources.

There was particular emphasis on the use of computers in various radioprotection practices and in dose calculation in medical treatments.

The interest of participants was always keen. Lectures were followed critically and were enlivened by interesting exchanges between lecturers and participants.

The participants have expressed (again this year) a wish for more visits and more time devoted to practical exercises. It seems that this would be difficult to organize in a one week long course. On the other hand, those who are likely to attend such a course could hardly attend a longer course.

List of Authors

- B. HENRY, Manager, Education and Training Programme
- Course Coordinators: as listed in Table I

