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SECY-1262

March 31, 1971

INFORMATION MEETING ITEM

IAEA RESEARCH COORDINATION MEETING AND NUCLEAR ACCIDENT DOSIMETRY EXPERIMENT AT ORNL MAY 3-15, 1971

Note by the Secretary

The General Manager has requested that the attached memorandum of March 31, 1971 from the Assistant General Manager for International Activities, with the following attachments, be circulated for consideration by the Commission at an early Information Meeting:

W. B. McCool

Secretary of the Commission

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

MAR 3 1 1971

Chairman Seaborg
Commissioner Ramey
Commissioner Johnson
Commissioner Larson
Commissioner

THRU: General Manager

IAEA RESEARCH COORDINATION MEETING AND NUCLEAR ACCIDENT DOSIMETRY EXPERIMENT AT ORNL, MAY 3-15, 1971

The purpose of this memorandum is to seek Commission approval for ORNL to serve as host to an International Atomic Energy Agency (IAEA) meeting and to permit alien participation (including some Soviet bloc scientists) in a nuclear accident dosimetry experiment to be conducted at ORNL, during the period May 3-15, 1971, as part of an IAEA coordinated research program in which scientists from over ten countries (including the U.S.) are participating. A description of the program, including its objectives and how it is to be carried out, and a list of the participating scientists in the program is attached.

ORNL is prepared to serve as host for the IAEA research coordination meeting and organize the intercomparison experiment referred to in the attachment. Most of the activities will be held at the Dosimetry Application and Research Facility (DOSAR), the Health Physics Research Reactor, the DOSAR offices, and the DOSAR low energy accelerator, all of which are outside of the ORNL fenced area. There will also be several group discussions and a few seminars which would be held in a conference room in the Central Research and Administration Building, and in a conference room at the ORNL cafeteria, which is inside the fenced area. Additionally, a general orientation tour of ORNL probably will be arranged, and, while the details have not yet been completed, the following facilities may be included: High Radiation Level Examination Laboratory, Oak

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Commission

Ridge Research Reactor, Graphite Reactor, High Flux Isotope Reactor and the Transuranium Processing Plant. There will be no access to the Y-12 security area.

Oak Ridge Operations Office has indicated that, while they are concerned about the proposed length of stay (about two weeks) by the Soviet bloc nationals in the group, they are prepared, if a determination is made at Headquarters that the benefits to the AEC from the meeting and experiment would be sufficient to justify the extended stay, to make arrangements to insure that: (1) limitations on Soviet bloc nationals are imposed; (2) an adequate security plan is implemented which precludes access to classified information or facilities by the visitors while in AEC facilities; and (3) all persons concerned with the visitors will be briefed prior to the visit.

Concerning Soviet bloc participation, we have been informed that participants from Czechoslovakia, Hungary, Poland and the USSR have been invited by the IAEA, despite the fact that AEC approval for this activity to be held at ORNL has so far not been obtained. (We believe the IAEA is aware that AEC approval is required for such an activity to be held at ORNL. Presumably the invitations were issued on the basis of a willingness expressed by ORNL staff participating in the program to arrange for the meeting and experiment to be held at ORNL.) A Soviet national on the IAEA staff, Mr. G. A. Dorofeev, who is responsible for coordinating the program, is also expected to attend. A request for approval for the specific Soviet bloc participants will be handled separately in the usual manner once a complete list of these persons is available. The total number of IAEA foreign participants will be approximately 15 to 20.

The Division of Biology and Medicine fully supports the convening of the IAEA meeting and conducting the proposed intercomparison experiment at ORNL as requested. DBM believes the programmatic benefits to be gained from the program justify the extended stay of the IAEA participants at ORNL, including the Soviet bloc scientists, and recommends that approval be given to enable ORNL to proceed with the formal arrangements involved.

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Commission

The Division of Security is being furnished with appropriate background information on the proposed participants and will bring to our attention any information resulting from the indices checks which should be taken into account at such time as the request for approval of specific individuals is processed. The Division also notes that, should the IAEA meeting and experiment be approved, Oak Ridge Operations Office has indicated that an adequate security plan will be implemented.

The Division of Intelligence cannot negate the possibility of foreign intelligence gain in view of the fact that ORGDP is a prime target of both the Soviet bloc and the French, but notes that the proposed security plan would tend to minimize such risk.

The Division of International Affairs believes there is merit in approving ORNL's request, both from the standpoint of our policy of generally supporting IAEA activities and programs, and the programmatic interest of the meeting and experiment. The Department of State has been consulted on the matter and concurs with this position.

In view of the foregoing, we recommend that the Commission approve extending a formal offer to the IAEA (1) to convene its research and coordination meeting on nuclear accident dosimetry and (2) to participate in an intercomparison experiment, both activities to be held at ORNL during the period May 3-15, 1971, with the understanding that approval for participation by specific Soviet bloc individuals will be considered separately once all their names become known.

Myron B. Kratzer
Assistant General Manager
for International Activities

Attachments:
Description of program and
list of participating scientists

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INTERNATIONAL ATOMIC ENERGY AGENCY

Coordinated Programme on Nuclear Accident Dosimetry

Information Sheet

1. Scientific Background

Nuclear (criticality) accidents may occur in installations wherein fissile materials are handled or stored in quantities exceeding the minimum critical amounts, e.g. critical assemblies, research and power reactors, fissile material enrichment and irradiated fuel processing plants, transportation or storage of fissile materials. Although the number of nuclear accidents which have occurred so far has been exceedingly small, they are likely to increase as the size of the nuclear energy industry continues to expand at the present accelerated scale.

Although it is difficult to assess the role and importance of dosimetry in nuclear accidents, the radiation doses received by the accident victims are generally considered in decisions regarding medical management and subsequent rehabilitation of the persons. Dosimetric data is also required in post-accident rescue operations and decontamination and in the analysis of the accident itself.

Nuclear accident dosimetry poses some challenging problems arising out of the complex radiation field which is emitted in critical excursions. The leakage radiation comprises a mixture of photon and neutron radiations which may vary widely, depending on the type of the criticality system and the circumstances of the accident. The measurement of this leakage spectrum is rendered difficult by the following: (1) inadequate capacity of various detectors to discriminate between the different types of radiation; (2) energy dependence of the response of the detectors; (3) lack of suitable detectors for measurement of intermediate-energy neutrons (from ca. 1 eV to ca. 0.5 MeV); (5) handling problems; (6) cost etc.

In the measurement of the radiation dose, additional problems arise because of (1) the effects of orientation and movement of the individual in the radiation field, (2) partial or non-uniform irradiation, (3) inhomogeneity of the radiation field (particularly in the case of neutrons) which may be produced by the presence of the human body.

A number of approaches - both physical and biological - are being made to solve many of these problems in nuclear accident dosimetry. Insofar as physical dosimetry is concerned, the methods used involve (1) measurements of induced radioactivity in the human body, (2) measurements of individual dose using personnel dosimeters and (3) measurements of the radiation field using zonal or area dosimeters.

A variety of detectors are used: (1) photographic; (2) gaseous ionization; (3) activation; (4) fission; (5) thermoluminescent; (6) photoluminescent; (7) semi-conductor; (8) chemical. Quite recently there is great interest in the use of detectors based on damage tracks in solids produced by fission fragments or heavy ions.

2. Scientific scope

The following are the objectives of the proposed coordinated research programme:

1. To carry out a systematic study of the characteristics of radiation detectors currently in use or being developed for use in nuclear accident dosimetry;

2. To effect any possible technical improvements in the detectors (with reference to radiation discrimination, energy dependence, fading, shelf-life and stability, ease of handling, ease of readout or automation, reduction of cost etc.);

3. To determine and appraise the limitations of the detectors for use in nuclear accident dosimetry;

4. To examine critically all the methods and the procedures;

5. To arrive at, if possible, a simple and adequate system or systems and to standardize the procedures, including the methods of interpretation;

6. To collect and prepare a compendium of information on the leakage spectra associated with different criticality systems.

3. Programme

The first four objectives will imply a comprehensive testing programme for radiation detectors which are either in use or are being considered for use in nuclear accident dosimetry. It is proposed to have a coordinated programme for this purpose. It is envisaged that this testing could be accomplished in a phased manner in a period of about three years as follows:

Phase I. Study of the characteristics of the detectors used in participating laboratories using intra-mural facilities such as critical assemblies, research reactors, neutron generators, accelerators.

Phase II. Inter-laboratory comparisons of the same or similar detectors.

Phase III. Multi-laboratory comparison of all nuclear accident dosimetry systems under conditions of irradiation closely simulating those of nuclear accidents.

The first phase will permit the staff of the participating laboratories to determine the suitability of a detector for use in nuclear accident dosimetry and to gain knowledge and experience with the detectors and will thus be of considerable educational and training value.

The second phase will be useful in checking the validity of the results obtained in phase I and in standardizing the procedures.

The last phase will involve experiments carried out at a central laboratory and will help to assess the various nuclear accident dosimetry systems and to arrive at optimal or preferred system(s).

The Agency's laboratory at Seibersdorf could be associated in the programme by supply of standard radioactive sources or detector materials subjected to standard irradiations. The IAEA Nuclear Data Centre could provide necessary neutron cross-section data.

The idea of such a coordinated programme of testing and comparison of nuclear accident dosimetry systems was discussed in a panel of experts which was convened by the Agency in Vienna in February 1969. The panel was unanimously in favour of the proposed programme. Reference was also made to some multi-laboratory intercomparison studies which have been made already by laboratories in France, UK and USA, and the valuable insights which have been gained from these studies.

4. Financial Support

In view of the limited financial resources of the Agency, it is proposed to have research agreements (which provide no financial remuneration) with selected laboratories in Member States. Some funds might become available from the research contract programme of the Agency. Literature describing this programme and copies of research contract proposal forms are appended to this information sheet.

It is proposed to start the coordinated programme on nuclear accident dosimetry during 1970.

ANNEX I

List of participants

Mr. W.G. Cross	Health Physics Branch Biology and Health Physics Division Chalk River Nuclear Laboratories Atomic Energy of Canada Limited Chalk River, Ontario CANADA
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Mr. A. Fasso	Laboratorio di Fisica Sanitaria Centro di Calcolo CNEN Via Mazzini 2 Bologna ITALY
Mr. R. Siwicki	Institute of Nuclear Research - N XIX Otwock - Swierk POLAND
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