liability should be limited in time and in amount; that the state in which a nuclear installation causing damage was located should alone be competent to establish detailed rules concerning liability, apportion liability between private parties and the state, and designate a court to process claims by victims. The secretariat was asked to prepare a draft convention embodying these views, to be discussed at the May meetings.

The first series of meetings showed that the specialists were of the unanimous opinion that they should formulate minimum principles acceptable to all nations and that these principles should interfere as little as possible with existing liability concepts and legislative efforts undertaken on a national or regional basis.

The chairman of the panel is Paul Ruegger (Switzerland), who is a member of the Permanent Court of Arbitration and of the board of the Academy of International Law, both in the Hague, and an associate member of the Institute of International Law in Geneva. The United States representative on the panel, which has ten members from as many countries, is Edward Diamond, who has just resigned as associate general counsel of the Atomic Energy Commission.

Yugoslav Atomic Accident Studied

A new IAEA project is closely related to the work of the panel. Two specialists from the International Agency are visiting the Yugoslav Atomic Energy Center, the Boris Kidric Institute at Vinca, near Belgrade, to study the pattern of circumstances that led to an accident there last October. At that time, a group of young Yugoslav scientists were exposed to high doses of radiation during an experiment with the critical assembly (zero power reactor) at Vinca. All but one of the scientists, who were treated at the Curie hospital in Paris, have recovered and are back in their own country.

In view of the importance of obtaining all possible information that would be helpful in elaborating general safety criteria for atomic work, IAEA Director-General Sterling Cole asked for permission to send IAEA investigators for studies and discussions on the spot.

The staff members who are visiting Vinca are Dean Brown and David Newby, both from the agency's Reactor Division. Brown is an American theoretical physicist who has specialized in reactor physics. His activities in the United States, at the Savannah River Laboratory, were connected with reactor kinetics problems, and in the last 2 years he has worked on safeguard studies. Recently he has taken part in the evaluation of the power reactor at Halden, Norway. Newby has worked at the United Kingdom's Atomic Energy Research Establishment at Harwell, in reactor engineering, and has had experience in the field of safety of reactors and critical assemblies.

Atomic Forum–Harvard Law Study

Possible approaches to the international nuclear liability problem are the subject of a report published last month by the Atomic Industrial Forum, the national association of the United States atomic industry. Entitled *International Problems of Financial Protection against Nuclear Risk,* the report is based on a study conducted under the auspices of the Forum and the Harvard Law School by a Harvard research team headed by Robert B. Eichholz, former counsel for this country's foreign-aid program.

The new study points out that the risk of loss through nuclear accident should be allocated so as to give "reasonable protection to the exposed public, while not obliging atomic enterprises to risk an intolerable burden of liability." "Ideally," the report says, "a solution is called for which would embrace *all* nations participating in the development of nuclear power, and which would deal with all phases of the third party liability problem."

The report notes, however, that pending adoption of a global convention, a western European convention now in preparation under the auspices of the Organization for European Economic Cooperation could "serve on an interim basis as a partial groundwork for further international arrangements and national legislation." The report strongly recommends government indemnification for damages exceeding the limit for which operators and suppliers would be held liable under the draft O.E.E.C. convention and urges that this be provided for in advance rather than after the event. The Harvard study team suggests, further, that an opportunity exists to work out a satisfactory solution to the third-party liability problem under the joint nuclear power program of the United States and the six countries of the Euratom community, all of whom are members of the O.E.E.C.

The Havard study is the second major independent research effort on the liability problem that the Atomic Industrial Forum has underwritten. The first, a study conducted for the Forum by the Legislative Drafting Research Fund of Columbia University, was devoted to the domestic aspects of the problem.

Special grants from more than 30 member organizations of the Forum, and contributions from the American Insurance Association and the American Mutual Insurance Alliance, made the Harvard study possible. The report may be obtained, at $6 per copy, from the Atomic Industrial Forum, 3 E. 45 St., New York 22, N.Y.

Radiation Control Assessed for Public Health Service

A report on the control of radiation hazards that was prepared by the National Advisory Committee on Radiation for the Surgeon General of the U.S. Public Health Service was released on 26 March. Excerpts from the report follow.

During the past several years, a number of scientific bodies, including the National Academy of Sciences of the United States and the United Nations Scientific Committee on the Effects of Atomic Radiation, have reported extensively on the influence of ionizing radiation on biological systems. From these reports it is evident that serious health problems may be created by undue radiation exposure and that every practical means should be adopted to limit such exposure both to the individual and to the population.

The principal sources of ionizing radiation which have been created or developed by man include x-ray machines, nuclear reactors and their radioisotopic by-products, high-energy particle accelerators, a number of concentrated forms of naturally occurring radioactive materials, and the fall-out constituents of nuclear weapons. Among these sources, only nuclear reactors, their fuels, their radioisotopic by-products, and their radioactive wastes have been placed under substantial regulation from the standpoint of their influence on health and safety. This is notwithstanding the fact that extensive studies have revealed that most of the ionizing radiation received by the population today, other than received from natural sources, has been from the x-ray machines employed by the health professions. Concerted effort is now being applied by these professions to reduce, as far as is possible, the exposure of individuals undergoing x-ray diagnosis and treatment. Even so, the absence of a comprehensive program through which the health hazards of all sources of ionizing radiation may be brought under supervision appears to this committee to be an important weakness in this nation's efforts to control radiation safely.

In addition to the rapid, anticipated growth of the use of devices and products which produce ionizing radiation, there is another factor which urgently points to the nation's need for a comprehensive program governing the public health aspects of this radiation. This is the increasing respect given by scientists to radiation exposure as demonstrated by the steady downward revision, made

over the past thirty years, in the maximum permissible levels of ionizing radiation recommended by the National Committee on Radiation Protection and other authoritative groups.

Elements of Radiation Control

It may be worth while at this time to examine briefly the methods currently used in the United States in the formulation of standards of radiation protection. In regard to scientific data, considerable research in radiation biology, chemistry and physics is contributing to the store of scientific knowledge needed for standards development. This research is being supported by the Division of Biology and Medicine of the Atomic Energy Commission and the National Institutes of Health of the Public Health Service as well as many other governmental groups. Although the magnitude of this research is substantial, a review of current scientific data, which quantitatively relate radiation doses to biological effect, indicates that many gaps exist within these data and that such gaps pose great difficulty in the establishment of many radiation protection standards on a wholly satisfactory basis. Since standards of radiation protection are of fundamental importance, greater emphasis must be placed on radiation research in the future.

Much of the responsibility for the evaluation of radiation data, and the subsequent preparation of recommendations which may be used as guides by regulatory agencies in the development of their operational protection standards, has been borne in the United States by the National Committee on Radiation Protection, a private quasi-official group of internationally known American and Canadian scientists who are modestly supported in their work by the Department of Commerce.

From time to time, a number of individuals and groups have suggested that the N.C.R.P. should be made a component of some specific governmental agency. They believe that, under these circumstances, the committee would gain stature and its recommendations would benefit from the more official status given them. The National Advisory Committee on Radiation, however, believes that there is much merit in the independent position which the N.C.R.P. enjoys. In such a climate, the actions of the N.C.R.P. have been singularly forthright and decisive and it is felt that it would be unfortunate if these characteristics were changed.

State versus Federal Regulation

The Federal Government, under authority granted by the Atomic Energy Act of 1954, occupies a dominant position in the field of atomic energy. Through its control of atomic fuels, production facilities, utilization facilities, facility operators, by-product materials, classified data and patents, the Federal Government through its operating agency, the Atomic Energy Commission, exercises a profound influence over the development of atomic science in industry, medicine, and a large number of other areas within our social structure. In addition to its responsibility for the promotion and development of atomic energy, the Atomic Energy Commission has been given authority to regulate its operations and those of its contractors in such a manner that the safety of the population both individually and collectively may be maintained.

The propriety of the Atomic Energy Commission to perform a regulatory function in radiation safety was soon questioned by a number of groups which believed that such responsibility is a function of state and local agencies, rather than that of the Federal Government. This, incidentally, is not withstanding ample legal precedent where Federal regulatory power has preempted state responsibility in instances where national interest was at stake.

It is not difficult to suggest examples where national interest might not be well served if regulation of radiation protection in the field of atomic energy were delegated entirely to state and local agencies. First, circumstances frequently occur where radiation hazards do not respect state and local boundaries and serious danger may be expected to develop if wider control is not provided. Furthermore, the existence of a variety of local and state radiation protection codes, each with differing standards, might impede the development of atomic machinery and techniques to such an extent that national interest might be severely jeopardized. Finally, a high level of competence has been achieved by scientists associated directly and indirectly with the Atomic Energy Commission and their ability to provide the technical knowledge necessary for the execution of sound programs in radiation is substantial. Indeed, the performance of those so concerned constitutes a record of which the AEC may be justly proud. At the state and local levels, on the other hand, such competence is only now beginning to develop.

Arguments on Other Side

In spite of the foregoing, the arguments for state versus Federal regulation of radiation safety are not entirely on the Federal side. Although competence in radiation safety has lagged until recently in many state and local health departments and in other agencies concerned with safety problems, intensive efforts are now being made to correct this shortcoming. Also, history gives strong support to the concept that where regulatory controls are needed for the safety of a community, these controls may be best exercised where the authority responsible for control is not far removed from the group or groups being protected. This concept is likely to prove equally valid in the field of radiation protection, for many radioactive materials used in medicine and industry, even though initially regulated, eventually become a part of environmental contamination and of necessity must be evaluated at the point of human exposure as a part of a moral health assessment program. Finally, many state and local governments have demonstrated over long periods of time that they are quite capable of operating effective control programs in important areas of human activity; for example, the record of public health authorities is difficult to surpass in the field of sanitation.

After careful consideration of the problem of state vs. Federal control of radiation safety, the committee believes that many of the regulatory enforcement functions of a radiation control program may be discharged effectively by state and local governmental agencies. Also, the committee believes it unwise to continue the assignment of primary authority over the public health aspects of atomic energy in the same agency that has a prime interest in the promotional aspects of the field. By this, the committee in no way wishes to imply criticism of the Atomic Energy Commission. It merely wishes to express a principle which it believes to be fundamentally sound. Furthermore, the committee does not wish to imply that the A.E.C. should not continue to pursue intensive radiation safety programs for the control of hazards in its own installations and in those of its contractors and licensees. Indeed, on the contrary, the commission has an obligation to do so. In matters involving the protection of the public's health against ionizing radiation, the committee believes the ultimate authority should be placed in an independent agency and preferably in one with a special interest in public health, i.e., the U.S. Public Health Service.

Comments and Recommendations

The committee recommends that:

(1) Primary responsibility for the nation's protection from radiation hazards be established in a single agency of the Federal Government. The committee believes that this agency should logically be the U.S. Public Health Service, Department of Health, Education and Welfare, and urges immediate legislation to achieve this objective.

(2) The agency be granted authority for broad planning in the field of radiation control. Such planning should include the coordination of state and local regulatory programs with the safety operations of Federal and private groups in a manner which will provide a unified attack on problems associated with the control of radiation hazards.

(3) This agency be given authority to develop a comprehensive program of control for all sources of radiation. In this connection, the committee wishes to call attention to the following principles and additional recommendations. (A) Problems of radiation control frequently do not respect state or regional boundaries but extend across large areas of the nation. Therefore, the committee recommends that the agency be charged with the responsibility of promulgating uniform, national standards on radiation protection. In order to meet this responsibility, the agency should take full advantage of the guidance provided by the National Committee on Radiation Protection and by other organizations of similar character. Furthermore, the committee recommends that the agency be granted authority to undertake intensive research programs aimed directly at the provision of scientific data for the development of improved standards of radiation protection. (B) The committee recommends that as much regulatory responsibility as possible be vested within state and local governments in the field of radiation protection. However, in order that the agency may be assured of discharging its responsibilities to the nation as a whole, the committee recommends that the agency be granted supervening authority in those areas of enforcement where Federal regulation seems more appropriate. It also recommends that this authority apply under those circumstances where a state or local government finds itself unable to meet its obligations. Finally, in order that state and local governments may discharge their responsibilities with the greatest effectiveness, the committee recommends that the agency be granted authority to provide technical and financial assistance to such governments, as in other public health programs. (C) The committee recommends that the agency be granted authority to undertake a broad range of training programs which will assure that the nation, state and local needs for personnel trained in radiation protection will be satisfactorily met.

Program Budget

It is anticipated that the cost of a comprehensive program of radiation control which includes the elements set forth in the foregoing recommendations will reach a level of approximately $50,000,000 in a period of five years. The committee recommends, however, that the program be developed gradually, perhaps at a level of approximately $2,500,000 in the fiscal year 1959–60 and increasing in magnitude until full development is reached in 1965. There is no question that the present situation calls for bold and decisive action. With such action based upon sound principle, the committee believes that the Federal Government should proceed with all deliberate speed.

Radiation Committee Members

Russell H. Morgan, chairman, professor of radiology, Johns Hopkins Medical School.

Victor P. Bond, medical department, Brookhaven National Laboratory.

Richard H. Chamberlain, professor of radiology, University of Pennsylvania Hospital.

James F. Crow, professor of genetics, University of Wisconsin.

Herman E. Hilleboe, commissioner of health, State Department of Health, Albany, N.Y.

Hardin B. Jones, Donner Laboratory, University of California, Berkeley.

Edward B. Lewis, professor of biology, California Institute of Technology.

Berwyn F. Mattison, executive secretary, American Public Health Association, New York.

Lauriston S. Taylor, chief, Atomic Radiation Physics Division, National Bureau of Standards, Washington.

George W. Thorn, physician-in-charge, Peter Bent Brigham Hospital, Boston, Mass.

Abel Wolman, professor of sanitary engineering, Johns Hopkins University.

Arthur H. Wuehrmann, professor of dentistry, University of Alabama.

European Reactor Planned

An agreement by 12 Western European nations to construct and share an experimental high-temperature, gas-cooled reactor was signed in Paris on 23 March. Euratom, the common market in nuclear power established by the six nations of the wider European Common Market, signed as a single entity. Austria, Denmark, Great Britain, Norway, Sweden, and Switzerland signed independently.

The new project, known as "dragon," is the third joint undertaking to be organized by the European Nuclear Energy Agency, an offshoot of the Organization for European Economic Cooperation. The reactor is to be built in Britain at the Winfrith Heath Research Establishment. The other projects so far set up by ENEA are a European company for the chemical processing of irradiated fuels, with a plant at Mol in Belgium, and a boiling heavy water reactor at Halden in Norway.

The Berber Tribes

A 2-year study of the Berber tribes of Morocco, one of the oldest groups living in North Africa, has been announced by the American Museum of Natural History. The study will be carried out by anthropologist David M. Hart and will include a survey of the social, political, and cultural organization of the Berbers living in the Rif and High Atlas Mountains of Morocco. Hart plans to make tape recordings, films, and still pictures. He will return to this country in the spring of 1961.

The Berbers are thought to be direct descendants of the aboriginal peoples of North Africa, and evidence of their existence can be found in Egyptian tomb paintings as early as 2400 B.C. At present they inhabit the lands between the Sahara and the Mediterranean from Egypt to the Atlantic coast. Despite a history of conquests by other peoples, they have retained a homogeneous culture, and most still speak Berber, a Hamitic language. They are simple agriculturists, and most practice Islam.

NSF Publishes Scientific Information Bulletin

The National Science Foundation has started publishing a bimonthly news bulletin, *Science Information News*. The periodical will provide a medium for reporting new and improved methods of disseminating scientific information and news of projects, grants, surveys, and cooperative undertakings sponsored by the foundation and other federal agencies, and by other public and private organizations—domestic, foreign, and international.

The first issue, for February and March, deals principally with events surrounding establishment of the NSF Science Information Service and the expansion of its program activities in accordance with provisions of the National Defense Education Act. In future issues, news coverage will extend to all phases of significant scientific information work, including research and development on information problems, establishment and operation of new groups in the field, data and reference centers, translation and publication programs, exchange and dissemination of published and unpublished documentary material, meetings and conferences, and international programs and projects in the scientific information field.

On page 1 of the February–March issue, Alan T. Waterman, director of NSF, says that it is the foundation's hope that *Science Information News* will be truly representative of the field as a whole and will provide an effective mechanism for the exchange of information among