The Committee on Interagency Radiation Research and Policy Coordination (CIRRPC) is chartered through the Federal Coordinating Council for Science, Engineering and Technology (FCCSET), Office of Science and Technology Policy, Executive Office of the President, Washington, D.C. 20506.

NOTICES

The opinions expressed herein do not necessarily reflect the opinions of the sponsoring institutions of Oak Ridge Associated Universities.

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CONTENTS

INTRODUCTION ...................................................... 1
  ▲ Program Highlights
  ▲ Other Accomplishments

CIRRPC ACTIVITIES ............................................. 8
  ▲ CIRRPC Policy Meetings
  ▲ Executive Committee Activities
  ▲ Other CIRRPC Activities

POLICY SUBPANEL ACTIVITIES ................................. 13
  ▲ Naturally Occurring and Accelerator-Produced Radioactive Materials (NARM)
  ▲ Public Education
  ▲ Recommendations on Radiological Protection
  ▲ Follow-Up to Science Panel Report No. 7:
    Planning for Human Health Effects Research in the Event of a Nuclear Accident

SCIENCE SUBPANEL ACTIVITIES ............................... 15
  ▲ Scientific Basis for Radiation Protection Standards:
    Neutron Quality Factor
  ▲ High-Linear Energy Transfer Radiation
  ▲ Ionizing Radiation Risk Assessment (BEIR IV)
  ▲ Use of BEIR V and UNSCEAR 1988 in Risk Assessment
\begin{itemize}
  \item Occupational Radiation Protection Research
  \item Health Effects of Electromagnetic Fields
  \item Fluence-Based System of Radiation Risk Assessment
\end{itemize}

\textbf{SPECIAL PROJECTS AND STUDIES} ......................... 19

\begin{itemize}
  \item Oak Ridge Associated Universities (ORAU) Report on the Health Effects of Low-Frequency Electric and Magnetic Fields
  \item National Council on Radiation Protection and Measurements (NCRP) Study on Collective Dose
  \item NCRP Study on Radon
  \item Update of ORAU Radiation Protection Fact Sheets
  \item Review of EPA's Draft Report on the Carcinogenicity of Electromagnetic Fields
  \item Review of EPA's 1991 Proposed Drinking Water Regulations for Radionuclides
\end{itemize}

\textbf{LEGISLATIVE MONITORING} ............................... 24

\begin{itemize}
  \item Fiscal 1993 Appropriations
  \item Elevating the Environmental Protection Agency (EPA) to Cabinet-Level Status
  \item Federal Facilities Compliance Act
  \item Global Warming
  \item Waste Isolation Pilot Plant
  \item Nuclear Testing Moratorium
\end{itemize}
A Veterans' Bills
A Radon

APPENDICES
A Acronyms ........................................ A-1
A CIRRPC Member Agencies and Representatives ............ B-1
A Policy and Science Subpanels and Working Groups .......... C-1
A Oak Ridge Associated Universities ......................... D-1
A CIRRPC Meetings ..................................... E-1
A Reports ............................................... F-1

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The Committee on Interagency Radiation Research and Policy Coordination (CIRRPC) is a subcommittee under the Federal Coordinating Council for Science, Engineering and Technology (FCCSET).

CIRRPC reports to the Office of Science and Technology Policy (OSTP), Executive Office of the President, through the Committee on Life Sciences and Health (CLSH), a FCCSET committee.

CIRRPC was chartered on April 9, 1984 by Dr. G.A. Keyworth II, then Science Advisor to the President and Director of OSTP, after the charters of three earlier interagency committees dealing with radiation had expired. Dr. Keyworth saw a continuing need to address Congressionally mandated and agency-instigated issues related to radiation research and policy. He established CIRRPC as a single FCCSET committee to address this need and to serve as a forum where its member agencies can discuss and resolve radiation issues to best serve national interests.

CIRRPC became a subcommittee of CLSH in January 1991 with the reorganization and re-chartering of the FCCSET committees under Dr. D. Allan Bromley, Director of OSTP and Assistant to the President for Science and Technology.

CIRRPC’s overall charge is to coordinate radiation matters among agencies, evaluate radiation research, and provide advice on the formulation of radiation policy.
CIRRRC's member agencies have policy and/or scientific roles in the regulation and/or use of radiation. There are currently 18 member agencies, the most recent of which is the National Science Foundation.

These agencies are each represented by subcabinet or senior policy representatives who not only represent their agencies on CIRRRC and its policy subpanels, but also review and approve reports developed by CIRRRC's subpanels.

CIRRRC holds general meetings two or three times a year to review the program and to address radiation policy issues that cut across multiple Federal agencies.

CIRRRC's Science Panel is composed of senior scientific representatives from 15 member agencies with interests in technical and scientific issues. The Panel's monthly meetings provide opportunities not only for discussions on radiation and scientific issues of mutual interest, but also for briefings on activities and programs within the agencies, including research programs, and for reviews of reports developed by the science subpanels.
**CIRRPC EXECUTIVE COMMITTEE**

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Chairman

Mr. Robert M. Bernero (NRC)  
Vice Chairman

Mr. Robert L. Brittigan (DOD)  
Executive Secretary

Dr. Randall S. Caswell (DOC)  
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Dr. Jerome S. Puskin (EPA)  
Executive Secretary, Science Panel

COL Everette E. Gray, U.S. Army (DOE)  
Technical Assistance Director

Mr. Thaddeus J. Dobry (DOE)  
(Alternate)

Funding for this contract is provided by the CIRRPC member agencies. The CIRRPC Executive Committee reviews ORAU's support and general progress monthly.

CIRRPC addresses radiation issues in response to requests from member agencies or OSTP, but it also deals with issues that are of overall interest to CIRRPC or its Science Panel. Once a specific issue is brought to CIRRPC's attention, a policy or a science subpanel is usually established to address it. At times, task groups or outside (non-Federal) consultants are used when additional expertise is needed, or when a non-Federal position on an issue is required.

**ISSUES OF INTEREST TO CIRRPC**

- the scientific basis for radiation protection standards
- assessments of health risk
- consensus-building among Federal agencies in policy and research
- public perception of radiation exposures and radioactivity
- consistency in regulatory measures and risk assessments
- risk estimation at doses and dose rates experienced by workers and the public
- applicability of protection standards for controlling routine releases to low-probability release events (waste disposal) and to cleanup criteria
- economic and societal consequences of the non-availability of low-level waste disposal sites

The CIRRPC Executive Committee is responsible for overall planning and general management of CIRRPC's programs and resources. The Committee is composed of officers from both the policy and science bodies and the Technical Assistance Director from the Department of Energy (DOE).

The Science Panel Executive Committee's principal responsibilities are to develop agendas for Science Panel meetings and to oversee the progress of the numerous Science Panel activities. Both the CIRRPC and Science Panel Executive Committees meet monthly.

The technical and administrative support required to facilitate CIRRPC's operation is provided through a DOE contract with Oak Ridge Associated Universities (ORAU), a not-for-profit research and development consortium of 65 universities and colleges. ORAU supports CIRRPC through the Oak Ridge Institute for Science and Education.
A subpanel's work usually culminates in the development of a report with recommendations on what further agency actions are warranted to resolve an issue or to provide additional information. The report reflects either consensus or, when this is not possible, the range of the members' opinions and positions. All CIRRPC reports are submitted to and approved by FCCSET prior to publication. (See Appendix F for a list of completed reports.)

Occasionally, CIRRPC also asks ORAU to develop reports on various issues. ORAU has completed reports on Federal radiation research, radiation protection standards and guides, and the health effects of extremely low-frequency electric and magnetic fields (ELF-EMF).

CIRRPC interacts with various national and international organizations to exchange scientific and policy information on radiation protection recommendations and research.

These organizations include the National Council on Radiation Protection and Measurements, the International Commission on Radiological Protection, the National Academy of Sciences, the Conference of Radiation Control Program Directors, the United Kingdom's National Radiological Protection Board, the Commission of the European Communities, the Health Physics Society, national laboratories, and public interest and industry groups.

**PROGRAM HIGHLIGHTS**

CIRRPC's eighth year was marked by the completion of several CIRRPC projects, including:

- an independent study on the possible health effects of extremely low-frequency electric and magnetic fields;
- a report evaluating the uncertainties identified in a National Academy of Sciences (NAS) report on the biological effects of ionizing radiation and their impact on the report's application to Federal risk assessment;
- an analysis of the use of two reports on radiation risk assessment from NAS and the United Nations; and
- an update of Part II of ORAU's radiation protection fact sheets, a compilation of major U.S. radiation protection standards and guides.

CIRRPC also sponsored a workshop on internal dosimetry and provided financial support to the 1991 Health Physics Society Summer School on the biological basis of radiation protection practice.

The program highlights briefly described below are discussed in more detail elsewhere in this report.
**Report on Ionizing Radiation Risk Assessment (BEIR IV)**

The Science Subpanel on Ionizing Radiation Risk Assessment (BEIR IV) was the first subpanel established by CIRRPC to review major scientific reports on the biological effects of ionizing radiation and to develop coordinated Federal positions on risk assessment for low levels of ionizing radiation. The Subpanel’s review focused on the risk factors in the 1988 NAS report, *Health Risks of Radon and Other Internally Deposited Alpha-Emitters: BEIR IV*. The Subpanel’s report was approved for publication as Science Panel Report No. 8 in October 1991.

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**ORAU Report on the Health Effects of Electromagnetic Fields**

A panel of non-Federal scientists convened by ORAU completed an independent evaluation of the reported health effects of exposure to ELF-EMF, especially reports of carcinogenesis and reproductive and neurophysiological effects. The ORAU Panel on the Health Effects of Low-Frequency Electric and Magnetic Fields reviewed about 1000 journal articles published within the last 15 years and focused on electromagnetic frequencies associated with electric power lines, household appliances, and video display terminals.

The panel members concluded that "...there is no convincing evidence in the published literature to support the contention that exposures to extremely low-frequency electric and magnetic fields (ELF-EMF) generated by sources such as household appliances, video display terminals, and local power lines are demonstrable health hazards."
Report on the Use of BEIR V and UNSCEAR* 1988 in Risk Assessment

This CIRRPC report was developed by the Science Subpanel established to facilitate the use of the NAS report, Health Effects of Exposure to Low Levels of Ionizing Radiation: BEIR V, and the United Nations report, Sources, Effects and Risks of Ionizing Radiation: UNSCEAR 1988, by Federal agencies.

The Subpanel report, Use of BEIR V and UNSCEAR 1988 in Radiation Risk Assessment: Lifetime Total Cancer Mortality Risk Estimates at Low Doses and Low Dose Rates for Low-LET Radiation, was the result of CIRRPC's second effort to achieve consensus on values used in Federal radiation risk assessments.

In December 1992, the report was submitted to FCCSET for approval as CIRRPC Science Panel Report No. 9.

(UPDATE: FCCSET approval was received in January 1993, and the report is currently in press.)

Update of ORAU's Radiation Protection Fact Sheets

ORAU's report, A Compendium of Major U.S. Radiation Protection Standards and Guides: Legal and Technical Facts (1988), was updated this year with the addition of five new/revised fact sheets.

The updated fact sheets covered the Environmental Protection Agency's (EPA) emission standards and drinking water regulations for radionuclides; EPA's standards for remedial actions at inactive uranium processing sites; and the Nuclear Regulatory Commission's basic radiation protection standards and requirements for land disposal of low-level radioactive waste.

Workshop on Internal Dosimetry

The CIRRPC Subpanel on Occupational Radiation Protection Research conducted the Workshop on Internal Dosimetry in April 1992 in Atlanta, Georgia. The workshop focused on the identification of deficiencies and corresponding research needs in the area of internal dosimetry.

Participants, including representatives from both U.S. and European scientific communities, identified research needs in three areas: metabolic models/metabolic data, data bases/registry data, and computation and dose calculations.

* United Nations Scientific Committee on the Effects of Atomic Radiation
The Health Physics Society (HPS) Summer School of 1991

The HPS Summer School was held in July 1991 at the Georgetown University in Washington, D.C. The School attracted over 70 American and international students and featured 17 eminent scientists who were invited to lecture on various aspects of radiological protection practice and its biological basis.

CIRRPC provided support for scholarship awards to 11 students and funds for the publication of the lectures in a book entitled The Biological Basis of Radiation Protection Practice.

The banquet guest speaker was Mr. Warren Brookes, a syndicated columnist from The Detroit News. Mr. Brookes (now deceased) was warmly received by the audience as he spoke about concerns over the Federal agencies’ tendency to over-regulate without the guidance of sound science.

OTHER ACCOMPLISHMENTS

CIRRPC also coordinated and completed interagency reviews of two EPA draft reports:

- a draft report on the carcinogenicity of electromagnetic fields; and
- the 1991 proposed primary drinking water regulations for radionuclides.
Dr. Alvin L. Young, CIRRPC Chairman, presided over the CIRRPC Policy Meeting held on November 7, 1991. The meeting was attended by various agency representatives, including new representatives from the Departments of Commerce, Health and Human Services (HHS), and Transportation, and the Environmental Protection Agency (EPA). The emphasis of the meeting was on radiation risk assessment and risk management.

Dr. Frank Young, Deputy Assistant Secretary of Health, Science, and Environment (HHS), spoke on recent developments in the area of risk assessment and risk management. He said that agencies have realized the need to agree on and use the same data in carefully examining risk assessment and risk management. There is also a growing awareness of risk assessment and risk management within the academic and industrial communities.

Dr. F. Young challenged CIRRPC to look into issues involved in mega-risk assessments. Work in this area needs to be institutionalized, understandable, and acceptable to both the academic community and Federal agencies. CIRRPC would be most helpful in determining how mega-risk assessments could be approached in a credible, scientific, and reliable manner.

Dr. Richard B. Belzer, an economist from the Office of Management and Budget, addressed the current regulatory issues in risk assessment and risk management. He noted that:

- regulations have continued to rely on conservative assumptions;
- the exaggeration of the benefits of regulation has created a bias toward regulatory action;
- margins of safety tend to be embedded in risk assessment;
- both public officials and the public have been misled regarding the magnitude of risk and the benefits of regulations; and
- estimates of risk have been distorted by the excessive focus on rare cancers.

He also spoke briefly about two Federal Coordinating Council for Science, Engineering and Technology (FCCSET) committees that have been created to address risk assessment on policy and technical levels. The technical level committee focuses on activities, in conjunction with other departments and agencies, to facilitate the formulation of recommendations on risk assessment.
Dr. Belzer added that these issues necessitate several changes, including:

- the increased use of distribution estimates, instead of point estimates;
- the use of available information on exposure; and
- where cost-effectiveness is prescribed by law, the need for agency regulators to clearly document costs which society would have to pay.

The second Policy Meeting was held with the Committee on Life Sciences and Health (CLSH) on June 15, 1992. At the joint session, the chairman and members of the Oak Ridge Associated Universities Panel on the Health Effects of Low-Frequency Electric and Magnetic Fields briefed the CIRRPC and CLSH members on their conclusions and recommendations.

A third Policy Meeting was held on December 3, 1992. The meeting featured briefings from the Departments of State (DOS), Defense (DOD), and Energy (DOE) on cooperative radiation research activities between the United States and the former Soviet Union. Representatives from DOE and the Nuclear Regulatory Commission (NRC) also gave presentations on decommissioning and clean-up criteria related to waste management.

Mr. Richard J.K. Stratford, Deputy Assistant Secretary for Nuclear Energy and Energy Technology Affairs (DOS), was invited to speak on his agency’s interactions with the former Soviet Union in cooperative radiation research. These activities began during the Nixon-Breshnev era, with limited cooperation under the Peaceful Uses Agreement, and continued through the post-Chernobyl period, with activities organized under a joint coordination center.

More recently, the emergence of a free press and the growth of the "green movement" in the former Soviet Union have resulted in a strong interest in the issues surrounding past nuclear activities and accidents. DOS is currently working with the former Soviet Union on data preservation, exposure studies, and the development of solutions to problems associated with Arctic dumping.

While the spirit of cooperation is hampered by problems associated with the lack of resources, political instability, and lingering suspicions, DOS continues to play a major role in the conduct of scientific relations between the United States and the former Soviet Union by establishing ties at high political levels.

Its operation on an international level gives DOS a worldwide view of scientific activities. By working closely with the U.S. scientific community, resources can be effectively applied, and duplication can be avoided.
Dr. Harry Pettengill, Deputy Assistant Secretary of Health (DOE), noted that his agency has been involved in studies dealing mainly with the health effects of the Chernobyl accident, as well as other environmental restoration and waste management issues.

Several projects and activities are in progress, and recent accomplishments include a workshop on biodosimetry, the training of several scientists from the former Soviet Union, a dosimetry project on the measurement of electron spin resonance in tooth enamel, experiments on resuspended aerosols, and the development of a radionuclide transfer model for the aquatic food chain.

According to CAPT Terry Sandin, USN, Special Assistant for Nunn-Lugar Initiatives, DOD’s involvement with the former Soviet Union are related mainly to weapons facilities and chemical weapons dismantlement. DOD has assisted in providing armored blankets for transport, emergency response equipment, transportation and storage containers, and railcar modification kits. DOD has also assisted in the disposition of materials, material control and accounting, and the development of safe storage facilities.

Mr. Andrew Wallo, III, Director of the Office of Environment, Safety, and Health (DOE), and Dr. Donald Cool, Branch Chief for Radiation Protection and Health Effects (NRC), addressed the issues of decommissioning and clean-up criteria.

Mr. Wallo briefed the group on DOE’s radiation standards for public protection risk assessment activities and residual radioactive material standards. Some DOE activities involve the utilization of risk assessment as input to new regulations and directives and the strengthening of interagency coordination.

Dr. Cool spoke about NRC’s enhanced participatory rulemaking, which aims to seek outside comments on rulemaking to amend 10 CFR Part 20. This amendment will include radiological criteria for the termination of licenses and the release of land and structures for unrestricted use.

The public will participate through a series of workshops to discuss issues and obtain the positions and rationale of interested parties. The workshops will begin in January 1993 and will include NRC, EPA, and representatives from States, tribes, industry groups, professional societies, and public and environmental interest groups.

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*The “Nunn-Lugar Initiatives” is Title V (Nonproliferation and Disarmament Programs and Activities) of the “Freedom for Russia and Emerging Eurasian Democracies and Open Markets Support Act of 1992” (The Freedom Support Act). The Initiatives include nonproliferation and disarmament activities in the independent states of the former Soviet Union and nonproliferation and disarmament funds to promote bilateral and multilateral nonproliferation activities on a worldwide basis.*
Dr. Cool also discussed the elements of NRC's Site Decommissioning Management Plan which describes non-routine decommissioning sites, the regulatory tools needed, and the policy, legal, and technical issues involved. The Plan documents NRC's management of sites, provides for tracking and reporting, and assures that problems are being resolved.

EXECUTIVE COMMITTEE ACTIVITIES

During the reporting period, the Executive Committee:

- welcomed the new CIRRPC technical liaison for the Office of Science and Technology Policy (OSTP), Dr. William Raub;
- agreed to provide financial support for a workshop on internal dosimetry organized by the Subpanel on Occupational Radiation Protection Research;
- approved the Work Statement for the Policy Ad Hoc Group on Radiological Emergencies and Human Health Effects Research;
- agreed with the CIRRPC working group on naturally occurring and accelerator-produced radioactive materials (NARM) that further efforts to address NARM regulations, under the working group's limited charter, would not be worthwhile;
- approved the letter to OSTP transmitting the CIRRPC member agencies' comments on EPA's proposed National Primary Drinking Water Regulations for Radionuclides;
- approved the transmittal of the report on the use of BEIR V and UNSCEAR 1988 in risk assessment to FCCSET, through CLSH, for approval as Science Panel Report No. 9;
- approved the letter to EPA transmitting the CIRRPC member agencies' comments on its draft report on the potential carcinogenicity of electromagnetic fields;
- met with the Director of the United Kingdom's National Radiological Protection Board (NRPB), Dr. Roger H. Clarke, and the NRPB Secretary, Mr. Geoff Webb, to discuss the NRPB and European responses to International Commission on Radiological Protection 60, the results of the first analysis of the National Registry for Radiation Workers, NRPB's review of the carcinogenic effects of electromagnetic fields, and the new electronic personal dosimeter developed by NRPB; and
- decided that CIRRPC's Annual Report shall henceforth cover the calendar year.

* Biological Effects of Ionizing Radiation
** United Nations Scientific Committee on the Effects of Atomic Radiation
OTHER CIRRPC ACTIVITIES

The work of other previously established panels and subpanels also continued and resulted in the completion of several draft reports that are currently in the revision, review, or approval stages. Among these are reports on:

- the regulation of discrete sources of NARM;
- the neutron "quality factor" in radiation protection;
- research needs related to neutron biological effectiveness and occupational exposures;
- public education on radiation;
- recommendations on radiological protection; and
- occupational radiation protection research.

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POLICY SUBPANELS AND WORKING GROUPS

- Working Group on Naturally Occurring and Accelerator-Produced Radioactive Materials (NARM)
- Subpanel on Public Education
- Subpanel on Recommendations on Radiological Protection

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SCIENCE SUBPANELS AND WORKING GROUPS

- Subpanel on Scientific Basis for Radiation Protection Standards
- Subpanel on High-Linear Energy Transfer Radiation
- Task Group on High-Linear Energy Transfer Radiation
- Subpanel on Ionizing Radiation Risk Assessment (BEIR IV)
- Subpanel on the Use of BEIR V and UNSCEAR 1988 in Risk Assessment
- Subpanel on Occupational Radiation Protection Research
- Subpanel on the Health Effects of Electromagnetic Fields
- Ad Hoc Group on a Fluence-Based System of Radiation Risk Assessment
and forwarded the Working Group’s draft report to NRC.

PUBLIC EDUCATION

CIRRPC and individual agencies have always been concerned with the lack of public perspective on matters involving radiation. The Subpanel on Public Education was established to address this issue by developing a coherent and coordinated Federal policy on public information on radiation and its health effects.

The Subpanel drafted a report, entitled Balancing Radiation Risks and Benefits: The Need for an Informed Public, which embodies the Subpanel’s findings, as well as ideas generated at its Federal Agency Radiation Information and Education Workshop held in 1991.

In the report, the Subpanel recommends the establishment of a national radiation information center, the creation of outreach programs, the establishment of communications infrastructure in agencies (or the enhancement of existing ones), and the encouragement of curriculum reform in mathematics and science education. The report is currently being finalized for submission to the CIRRPC Executive Committee.

The approved report is expected to be available for public distribution in 1993.
The Subpanel on Recommendations on Radiological Protection was established to help keep CIRRPC member agencies informed of new developments and plans for providing overall radiation protection measures. This task involves the review of recommendations and relevant publications of both national and international bodies addressing important radiation issues.

The Subpanel also serves as the focal point where Federal agencies can discuss their individual programs and plans. This lends itself to consensus-building and the avoidance of inconsistencies in U.S. protection procedures and practices.

During this reporting period, the Subpanel provided a means for the Department of State to develop a coordinated U.S. position on a draft revision of the International Atomic Energy Agency's basic radiation safety report.

The CIRRPC Executive Committee concluded that since the implementation of planning for health effects research is closely tied to individual agencies' programs, no CIRRPC inter-agency program is needed. The Executive Committee added, however, that CIRRPC is ready to assist its member agencies in their programs, as appropriate.

FOLLOW-UP TO SCIENCE PANEL REPORT NO. 7: PLANNING FOR HUMAN HEALTH EFFECTS RESEARCH IN THE EVENT OF A NUCLEAR ACCIDENT

The Ad Hoc Group on Radiological Emergencies and Human Health Effects was dissolved after it completed its evaluation of the feasibility of the planning recommendations outlined in the CIRRPC Science Panel report, Planning for Human Health Effects Research in the Event of a Nuclear Accident (June 1990).
SCIENTIFIC BASIS FOR
RADIATION PROTECTION
STANDARDS: NEUTRON
QUALITY FACTOR

This Subpanel was established to examine
the scientific basis and concepts used in
developing U.S. radiation protection standards
and guides. The Subpanel's efforts have fo-
cused on the International Commission on
Radiological Protection (1985) and National
Council of Radiation Protection and Measure-
ments (1987) recommendation calling for an
increase in the quality factor of neutrons (Qn)
by a factor of two; in effect, increasing the
recommended Q for fast neutrons from 10 to
20.

The Subpanel continues to examine this issue
by reviewing the basis and the experimental
data relevant to the selection of an appropriate
value of Q, for use in radiation protection. A
report on the Subpanel's findings is expected
to be completed in 1993.

HIGH-LINEAR ENERGY TRANSFER
RADIATION

This Subpanel was established to monitor
the status of research and analyses addressing
high-LET radiation and its biological effect-
iveness.

IONIZING RADIATION
RISK ASSESSMENT (BEIR IV)

The Subpanel on Ionizing Radiation Risk
Assessment (BEIR IV) was established to
review the major scientific reports on the
biological effects of ionizing radiation. This
was in response to a Department of Defense
request for assistance in developing a coor-
dinated Federal position on risk assessment for
low levels of ionizing radiation.

The Subpanel conducted a review of the
cancer risk estimates in the National Academy
of Sciences (NAS) report, Health Risks of
Radon and Other Internally Deposited Alpha-
Emitters: BEIR IV.

\* Biological Effects of Ionizing Radiation
In October 1991, the Committee on Life Sciences and Health (CLSH) and the Office of Science and Technology Policy (OSTP) approved the publication of the Subpanel's report as CIRRPC Science Panel Report No. 8.

**USE OF BEIR V AND UNSCEAR 1988 IN RISK ASSESSMENT**

This Subpanel was established to facilitate the use of the NAS report, *Health Effects of Exposure to Low Levels of Ionizing Radiation: BEIR V*, and the United Nations report, *Sources, Effects and Risks of Ionizing Radiation: UNSCEAR 1988*, in a coordinated manner by agencies that have risk assessment responsibilities related to ionizing radiation exposures.

Specifically, the Subpanel:

- evaluated how the uncertainties identified in BEIR IV would impact the report's application to Federal risk assessments;

- identified the Federal radiation activities to which BEIR IV's scientific analysis might be applied; and

- provided the Science Panel with a report on the potential for consistent use of BEIR IV in Federal risk assessments.

The Subpanel members noted in their report, *Ionizing Radiation Risk Assessment: BEIR IV*, the emphasis given to radon in the NAS report. They concluded that the radon risk value does represent a basis for Federal agreement; values for other internally deposited alpha emitters are acceptable for use, with some conditions. They further recommended that similar reviews for BEIR V, UNSCEAR 1988, and other similar resource documents be conducted.

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*United Nations Scientific Committee on the Effects of Atomic Radiation*
The Subpanel’s report, Use of BEIR V and UNSCEAR 1988 in Radiation Risk Assessment, Lifetime Total Cancer Mortality Risk Estimates at Low Doses and Low Dose Rates for Low-LET Radiation, was approved for publication as CIRRPC Science Panel Report No. 9 by CLSH in December 1992; it was forwarded to the Chairman of the Federal Coordinating Council for Science, Engineering and Technology (FCCSET).

(UPDATE: The report was approved by the FCCSET Chairman, Dr. D. Allan Bromley, in January 1993.)

In its report, the Subpanel recommends two nominal risk estimates for lifetime total cancer mortality following whole body exposures to low doses and low dose rates of low-LET ionizing radiation: one for the general population and one for the working-age population.

The report also provides a general statement on the scientific uncertainty associated with the application of the nominal risk estimates at low exposures generally experienced by workers and the public.

**OCCUPATIONAL RADIATION PROTECTION RESEARCH**

This Subpanel was established in response to a letter from the Nuclear Regulatory Commission indicating a need for interagency coordination in the area of radiological health protection research. Specifically, the Subpanel’s work statement calls for a review of occupational radiation exposure control practices and agency responsibilities for conducting related research. In addition, the Subpanel has been requested to identify present and anticipated critical research needs not currently being addressed.

The Subpanel’s draft report, National Priorities for Occupational Radiation Protection Research, represents the culmination of an extensive canvass of government, professional, societal, commercial, state, and local-level occupational radiation protection concerns.

The four broad areas of radiation research identified by the Subpanel as being especially important to worker protection are:

- the reduction of uncertainties in health risk coefficients;
- improvements in external personal dosimetry techniques applicable to workplace exposures and limits;
- improvements in internal bioassay techniques applicable to workplace exposures and limits; and
- advanced techniques for health physics instrumentation.
In April 1992 the Subpanel conducted the Workshop on Internal Dosimetry in Atlanta, Georgia, to identify and address deficiencies and corresponding research needs in the area of internal dosimetry. Over 40 participants from Federal agencies, national laboratories, the nuclear power industry, and European organizations discussed issues under three main areas: metabolic models/metabolic data, data bases/registry data, and computation and dose calculations.

At the workshop, ideas for resolving research needs were generated. These ideas or action items were categorized into actions which could be conducted by the Subpanel, actions which need interagency collaboration, and actions requiring major multi-agency support and funding.

A report outlining the Subpanel's conclusions and recommendations is expected to be completed in 1993.

The Subpanel developed a work statement to conduct an external review of the reported health hazards of exposure to extremely low-frequency electric and magnetic fields, especially reports of carcinogenesis and reproductive and neurophysiological effects. CIRRPC then tasked ORAU to establish a panel of independent (non-Federal) experts to address the work statement. (See related discussion under Special Projects and Studies.)

Since completing their initial task of developing the work statement, the Subpanel has periodically met to discuss Federal programs and issues associated with electromagnetic fields.

### HEALTH EFFECTS OF ELECTROMAGNETIC FIELDS

In response to a request from the Department of Labor and public concerns generated by mass media coverage of reported health hazards from household electrical appliances and electric power lines, CIRRPC established a Subpanel to address the validity of these reports.

### FLUENCE-BASED SYSTEM OF RADIATION RISK ASSESSMENT

Late in this reporting period, the Science Panel approved the creation of an ad hoc group to develop a work statement to consider the use of particle fluence in radiation risk assessment, such as in applications to high-Z particles experienced by mission personnel in space exploration. Particle fluence is the number of particles per unit area on or passing through a sphere.
The literature review consisted of approximately 1000 journal articles which were evaluated according to:

- the strength of the evidence that the electric and magnetic fields cause the reported phenomena;
- the biological basis for potential adverse human health effects;
- the dose-effect relationship between the fields and adverse human effects;
- the uncertainties involved in epidemiological studies; and
- the strengths and limitations of laboratory and theoretical studies.

The panel was also requested to address the adequacy of available data upon which to base reasonable quantitative risk assessments.


In developing the report, specific chapters, especially when they involved original work, were reviewed by experts in the scientific community. However, in order to preserve the independence of the panel, neither the Federal agencies nor the Office of Science and Technology Policy (OSTP) were provided draft material for review.
The panel members concluded that "...there is no convincing evidence in the published literature to support the contention that exposures to extremely low-frequency electric and magnetic fields (ELF-EMF) generated by sources such as household appliances, video display terminals, and local power lines are demonstrable health hazards."

Although the Panel noted some biological effects produced by these fields that may be of scientific interest, the Panel also concluded that "...in the broad scope of research needs in basic science and health research, any health concerns over exposures to ELF-EMF should not receive a high priority."

Public notice of the report and its availability was contained in an OSTP press statement released at a meeting of the President's Council of Advisors in Science and Technology in November 1992.
Collective dose, the product of the numbers of persons exposed times their average exposure, is used in assessing population health risks and in making decisions for radiation protection, where a balance between risk and cost is required. It is a topic of interest to many Federal agencies, as well as to other national and international organizations, responsible for radiation protection.

Under CIRRPC sponsorship, ORAU contracted with NCRP for a study on collective dose. As proposed, the NCRP study would be a critical review of the concept of collective dose, relative to its use in controlling radiation exposure and in assessing health risks resulting from such exposures.

Specific tasks to be completed in relation to the study include:

- a review of the current applications of the collective dose concept;
- an examination of the scientific basis and validity for applying the concept of collective dose in radiation protection and risk assessment; and
- an examination of the meaning and usefulness of the collective dose concept as used in protecting both workers and members of the general public.

Work on this effort is progressing under NCRP Scientific Committee 1-3, a committee operating under the umbrella of Scientific Committee 1 on Basic Radiation Protection Criteria. The draft report is currently under critical review within NCRP and is expected to be released as an NCRP report in 1993.

NCRP STUDY ON RADON

In October 1990, ORAU entered into a second contract with NCRP to develop and publish a comprehensive report examining the radon exposure levels experienced by the U.S. population and the health concerns associated with these levels. This report will reflect the considerable amount of new information available since NCRP Report 78 was issued in 1984.

This evaluation of occupational and environmental exposures to radon and radon decay products is being carried out by NCRP’s Scientific Committee 85. The study is expected to be published by NCRP in 1993.
UPDATE OF ORAU RADIATION PROTECTION FACT SHEETS


The report contains summaries of legal and technical facts on requirements for over 20 radiation protection standards. It also includes Federal Guides on radiation protection, approved by Presidential signature, as well as standards promulgated or proposed by the Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), the Occupational Safety and Health Administration, the Mine Safety and Health Administration, and the Food and Drug Administration.

The update covered five new/revised Fact Sheets:

- 40 CFR 61, EPA’s National Emission Standards for Hazardous Air Pollutants: Radionuclides (1989);
- 40 CFR 141, EPA’s Proposed National Primary Drinking Water Regulations for Radionuclides (1991);
- 40 CFR 192, EPA’s Proposed Standards for Remedial Actions at Inactive Uranium Processing Sites (1987);
- 10 CFR 20, NRC’s Standards for Protection Against Radiation (1991); and

REVIEW OF EPA’S DRAFT REPORT ON THE CARCINOGENICITY OF ELECTROMAGNETIC FIELDS

CIRRPC completed an interagency review requested by EPA of its draft report, *Evaluation of the Potential Carcinogenicity of Electromagnetic Fields*. In a letter of transmission to EPA highlighting the agencies’ major comments, the reviewers concluded that the evidence presented in the EPA report did not provide a scientifically sound basis for linking cancer to exposures to electric and magnetic fields.

The reviewers recommended a substantial revision of the report to address comments raised by the group and the individual agencies. They also suggested that the report state, as clearly as possible, whether or not the public is being exposed to serious health risks from electric and magnetic fields.
REVIEW OF EPA’S 1991 PROPOSED DRINKING WATER REGULATIONS FOR RADIONUCLIDES

In a memorandum, dated December 4, 1991, OSTP requested CIRRPC to conduct an independent review of the scientific basis of EPA’s proposed drinking water regulations, in accord with a prior request from the Office of Management and Budget. The proposed regulations would limit concentrations of radon, radium, uranium, beta- and gamma-emitting radionuclides, and other alpha-emitting radionuclides in drinking water.

The CIRRPC Science Panel members were asked to review both the proposed regulations and the background and criteria documents.

CIRRPC’s reviewers concluded that "...many, if not all, of the MCLs [maximum contaminant limits] (proposed by EPA) may be safely raised or eliminated, and that in...promulgating a final rule for radionuclides in drinking water, EPA [should] give further attention to resolving...scientific issues in a manner that establishes a credible scientific base for its proposed regulation."

CIRRPC’s conclusions and recommendations were sent to both OSTP and EPA.
The second session of the 102nd Congress was adjourned on October 9, 1992—the earliest adjournment date in 16 years. The Senate was in session for only 129 days, while the House was in session for 126 days.

The 1990 budget agreement had a "firewall" which prevented the transfer of funds between domestic and defense accounts. The $1.5 trillion budget resolution approved by the House set domestic spending close to existing spending levels and applied savings from defense cuts to the deficit. Major legislation that eeked out of the Second session rarely had a big spending tag.

The following describes Congressional actions on some of the bills of interest to CIRRPC.

FISCAL 1993 APPROPRIATIONS

Congress passed all 13 regular appropriations bills within days of the start of the 1993 fiscal year. Congress passed only one short-term continuing resolution, through October 5, to allow time to finish work on the bills. The president signed the last of the appropriations bills on October 6.

ELEVATING THE ENVIRONMENTAL PROTECTION AGENCY (EPA) TO CABINET-LEVEL STATUS

A bill to transform EPA to a Cabinet department was passed in the Senate, but not in the House.

Proponents of the bill argued that among its many virtues was the clout it would give EPA in negotiating international environmental agreements and the emphasis it would add to national environmental issues.

FEDERAL FACILITIES COMPLIANCE ACT

President Bush signed into law (P.L. 102-386) a bill that explicitly removes sovereign immunity claimed by Federal agencies as a shield against prosecution and fines for violating Federal solid and hazardous waste laws.

The Act explicitly waives that protection and subjects the facilities to the same fines as other polluters. U.S. agents and employees can be subject to criminal sanctions under Federal or State solid or hazardous waste laws, but cannot be held liable for civil penalties for acts or omissions within the scope of their official duties; Federal agencies cannot be subjected to criminal sanctions.
The Act, however, institutes a three-year moratorium on waiving sovereign immunity and fines and penalties for storage or disposal of mixed waste. It also includes a provision requiring that environmental fines collected by States must be spent only for environmental purposes.

WASTE ISOLATION PILOT PLANT

President Bush signed the Waste Isolation Pilot Plant (WIPP) bill into law (P.L. 102-579) on October 30, 1992. The Act transfers the New Mexico site to the Department of Energy (DOE) for the WIPP project and sets certain conditions that must be met for using the site for testing and the storage of transuranic nuclear waste at the WIPP. One such condition is that DOE must meet standards to be set by EPA.

The Act also authorizes Federal aid to the State of New Mexico in the amount of $20 million/year for 15 years.

NUCLEAR TESTING MORATORIUM

Congress included in the annual Energy and Water Appropriations Bill a ban on all nuclear testing after September 30, 1996 (P.L. 102-377). The Act also bans underground testing for nine months (existing treaties ban testing in the air or at sea). After this pause, the Act will allow a limited number of tests for safety-related improvements to weapons already deployed. The Act bans all underground nuclear tests after September 30, 1996, unless another country conducts such tests.

GLOBAL WARMING

The Senate ratified a United Nations treaty (Treaty DOC 102-38) requiring countries to try to limit emissions of heat-trapping "greenhouse-gases," including carbon dioxide and methane, thought to contribute to global warming. The treaty was signed by the President on June 12, 1992. The document does not mandate specific timetables or emission levels for individual countries.

The fast action by the Senate and the President makes the United States the fourth country to become a party to the treaty. The others are the three small island nations of Mauritius, Seychelles, and the Marshall Islands.
COMPREHENSIVE ENERGY POLICY ACT OF 1992

The Energy Act is the first overhaul of the nation's energy laws in more than a decade. It seeks to decrease U.S. dependence on foreign oil by increasing conservation measures and domestic energy production. Its major provisions restructure the electric utility industry to promote competition, mandate greater energy efficiency and the use of some automobiles that run on non-gasoline fuels, and simplify nuclear power plant licensing.

The Act restructures the Federal uranium enrichment enterprise into a government-owned corporation and also authorizes billions of dollars in energy-related (including nuclear) research and development.

Other elements of the Act include:

- a public information dissemination program and research on electric and magnetic fields;
- Remedial Action and Uranium Revitalization;
- the licensing of the Atomic Vapor Laser Isotope Separation (AVLIS) technology; and
- State authority to regulate radiation below the level of regulatory concern of the Nuclear Regulatory Commission.

VETERANS' BILLS

An act improving the compensation of certain veterans for exposure to ionizing radiation and the administration of veterans' benefits programs was signed into law (P.L. 102-578) on October 30, 1992. It expanded the current list of 13 types of cancer-related diseases eligible for compensation under the "Radiation-Exposed Veterans Compensation Act of 1988" (P.L. 100-321) to include cancers of the salivary gland and the urinary tract.

RADON

A radon protection bill was passed in both the House, the "Radon Awareness and Disclosure Act" (H.R. 3258), and the Senate, the "Indoor Radon Abatement Reauthorization Act of 1992" (S. 792). The bill, however, did not emerge from conference and will probably be reintroduced in the 103rd Congress.
APPENDICES
<table>
<thead>
<tr>
<th>ACRONYMS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEIR</td>
<td>(Committee on the) Biological Effects of Ionizing Radiation</td>
</tr>
<tr>
<td>CIRRPC</td>
<td>Committee on Interagency Radiation Research and Policy Coordination</td>
</tr>
<tr>
<td>CLSH</td>
<td>Committee on Life Sciences and Health</td>
</tr>
<tr>
<td>DOC</td>
<td>Department of Commerce</td>
</tr>
<tr>
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<td>Department of Defense</td>
</tr>
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</tr>
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<td>ELF-EMF</td>
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</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
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</tr>
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<td>Office of Science and Technology Policy</td>
</tr>
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<td>United Nations Scientific Committee on the Effects of Atomic Radiation</td>
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</tr>
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<td>U.S. Department of Agriculture</td>
</tr>
</tbody>
</table>
APPENDIX B

CIRRPC MEMBER AGENCIES AND REPRESENTATIVES
(* Denotes Science Panel Member)

▸ Department of Agriculture
Dr. Essex E. Finney, Jr.
Dr. Donald L. White (Alt.)
Mr. John T. Jensen*
Dr. Ronald E. Engel* (Alt.)

▸ Department of Commerce
Dr. Leslie E. Smith
Dr. Randall S. Caswell (Alt.)
Mr. Charles M. Eisenhauer*
Dr. Bert M. Coursey* (Alt.)

▸ Department of Defense
Dr. John H. Birely
Maj Gen Kenneth L. Hagemann (Alt.)
CAPT William J. Flor, Ph.D.*
CAPT Robert L. Bumgarner, MC, USN* (Alt.)

▸ Department of Energy
Dr. Paul L. Ziemer
Dr. Harry J. Pettengill (Alt.)
Mr. C. Rick Jones (Alt.)
Dr. Robert W. Wood*
Dr. Matesh Varma* (Alt.)

▸ Department of Health and Human Services
Mr. James S. Benson
Dr. Marvin Rosenstein (Alt.)
Dr. Gilbert W. Beebe*
Dr. Bruce W. Wachholz* (Alt.)

▸ Department of Housing and Urban Development
Mr. Richard H. Broun
Mr. Richard J. Alexander* (Alt. for Policy Panel)
Mr. Joel Segal* (Alt.)

▸ Department of the Interior
Mr. James F. Devine
Dr. Edward Landa*

▸ Department of Justice
Mr. Tim O'Rourke (Acting)
Mr. Jeffrey Axelrad (Alt.)

▸ Department of Labor
Mr. Robert E. Copeland
Ms. Margie E. Zalesak, C.I.H.* (Alt. for Policy Panel)
Dr. Sheldon R. Weiner*
- **Department of State**
  Mr. Charles M. Newstead

- **Department of Transportation**
  Dr. Robert A. McGuire
  Mr. James K. O'Steen (Alt.)
  Mr. George A. Brown*
  Mrs. Kristin Smith Curling* (Alt.)

- **Department of Veterans Affairs**
  Mr. Robert E. Coy
  Mr. Frederick Conway (Alt.)

- **Environmental Protection Agency**
  Ms. Margo Oge
  Mr. Eugene C. Durman (Alt.)
  Dr. Gordon Burley (Alt.)
  Mr. J. William Gunter*
  Dr. Jerome Puskin* (Alt.)

- **Federal Emergency Management Agency**
  Mr. Dennis Kwiatkowski
  Mr. Craig Wingo (Alt.)
  Mr. Vernon Wingert (Alt.)
  Mr. Marlow J. Stangler*
  Mr. George C. Meyer* (Alt.)
  Mr. Michael S. Pawlowski* (Alt.)

- **National Aeronautics and Space Administration**
  Mr. Leven B. Gray
  Mr. Charles W. Mertz (Alt.)
  Dr. Frank M. Sulzman*
  Dr. Donald Robbins* (Alt.)
  Dr. Walter Schimmerling (Consultant)

- **National Science Foundation**
  Dr. Philip Harriman
  Dr. Arthur Kowalsky*

- **Nuclear Regulatory Commission**
  Dr. Bill M. Morris
  Mr. Robert Bernero (Alt.)
  Dr. Donald A. Cool*

- **Office of Management and Budget**
  (Vacant)

- **Office of Science and Technology Policy**
  Dr. D. Allan Bromley
  Dr. Donald A. Henderson
  Mr. Charles Dickens

- **Committee on Life Sciences and Health**
  Dr. James O. Mason
  Dr. Karen Hulebak
POLICY AND SCIENCE SUBPANELS
AND WORKING GROUPS

POLICY

- Working Group on Naturally Occurring and Accelerator-Produced Radioactive Materials (NARM)
  - Dr. Mary E. Carter, USDA (Chairman)
  - Mr. R. Thomas Bell, DOE
  - Dr. William H. Blahd, DVA
  - COL David R. Case, DOD
  - Mr. J. William Gunter, EPA
  - Ms. Cynthia Jones, NRC
  - Dr. Donald Thompson, HHS
  - Mr. Robert Jarrett, DOE
  - Mr. John T. Jensen, USDA
  - LT COL Chris Johnson, DOD
  - Mr. C. Rick Jones, DOE
  - Mr. Allan Richardson, EPA
  - Dr. Marvin Rosenstein, HHS
  - Mr. Carl Siebentritt, FEMA (Alt.)

- Subpanel on Recommendations on Radiological Protection
  - Dr. Donald A. Cool, NRC (Chairman)
  - Mr. A. Wendell Carriker, DOT
  - Dr. Bert M. Coursey, DOC
  - Lt Col Eric G. Daxon, Ph.D., DOD
  - Mr. Robert Jarrett, DOE
  - Mr. John T. Jensen, USDA
  - LT COL Chris Johnson, DOD
  - Mr. C. Rick Jones, DOE
  - Mr. Allan Richardson, EPA
  - Dr. Marvin Rosenstein, HHS
  - Mr. Marlow J. Stangler, FEMA
  - Mr. Carl Siebentritt, FEMA (Alt.)

SCIENCE

- Subpanel on Scientific Basis for Radiation Protection Standards
  - Dr. Robert G. Thomas, DOE
  - CAPT David George, DOD

- Subpanel on High-Linear Energy Transfer (LET) Radiation
  - Dr. Bruce W. Wachholz, HHS (Chairman)
  - CDR Eric Kearsley, MSC, USN, DOD
  - Dr. Lawrence S. Myers (Consultant)
Task Group on High-LET Radiation

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Battelle Northwest

Dr. Johan Broerse
Institute of Applied Radiobiology
and Immunology, The Netherlands

Dr. Mortimer M. Elkind
Radiology and Radiation Biology
Colorado State University

Dr. Dudley Goodhead
Medical Research Council,
United Kingdom

Dr. Nancy L. Oleinick
Division of Biochemical Oncology
University Hospitals
Case Western Reserve University

Subpanel on Ionizing Radiation Risk Assessment (BEIR IV)

Dr. Robert Thomas, DOE (Chairman)
Dr. Richard A. Albanese, DOD
Dr. Jerome Puskin, EPA
Dr. James M. Smith, HHS
Dr. Shlomo Yaniv, NRC

Subpanel on Occupational Radiation Protection Research

Mr. R. Thomas Bell, DOE (Chairman)
CDR Roby D. Enge, MSC, USN, DOD
Dr. Judith Foulke, DOE
Dr. Joel Rabovsky, DOE
Ms. Charleen T. Raddatz, NRC
Mr. Lester Slaback, DOC
Dr. Matesh Varma, DOE
Dr. Sheldon R. Weiner, DOL
Dr. Tom Crites (Consultant)

Subpanel on the Health Effects of Electromagnetic Fields

Dr. Robert McGaughy, EPA (Chairman)
Dr. John O. de Lorge, USN
CDR Robert Yacovissi, MSC, USN (Alt.)
Dr. Imre Gyuk, DOE
Ms. Janet Healer, DOC
Mr. John C. Monahan, HHS
Dr. Sheldon R. Weiner, DOL

Subpanel on the Use of BEIR V and UNSCEAR 1988 in Risk Assessment

Dr. Marvin Rosenstein, HHS
(Chairman)
Dr. Gilbert W. Beebe, HHS
Dr. Frank J. Congel, NRC
CAPT William J. Flor, Ph.D., DOD
Dr. Daniel Hoffman, HHS
Mr. Christopher Nelson, EPA
Mr. Anthony A. Weadock, DOE
Mr. Charles A. Willis, NRC

ORAU Panel on the Health Effects of Low-Frequency Electric and Magnetic Fields

Dr. J. Glenn Davis (Chairman)
Medical Sciences Division
Oak Ridge Associated Universities

Oral Panel on the Use of BEIR V and UNSCEAR 1988 in Risk Assessment

Dr. William R. Bennett, Jr.
Department of Applied Physics
Yale University

Dr. Joseph V. Brady
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Johns Hopkins University
School of Medicine
Dr. Robert L. Brent
Division of Developmental Biology
A.I. duPont Institute
and Jefferson Medical College

Dr. Leon Gordis
Department of Epidemiology
Johns Hopkins University School
of Hygiene and Public Health
and Department of Pediatrics
Johns Hopkins University School
of Medicine

Dr. William E. Gordon
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Dr. Samuel W. Greenhouse
Department of Statistics
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Dept. of Cellular and Structural
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Health Science Center

Dr. Gary S. Stein
Department of Cell Biology
University of Massachusetts
Medical Center

Dr. Charles Susskind
Department of Bioengineering
University of California

Dr. Dimitrios Trichopoulos
Department of Epidemiology
Harvard School of Public Health

Ad Hoc Group on a Fluence-Based
System of Radiation Risk
Assessment

CDR Eric Kearsley, MSC, USN,
DOD (Chairman)
Mr. Ken Duvall III, DOE
Dr. Walter Schimmerling, NASA
Mr. Steve Seltzer, DOC
Dr. Matesh Varma, DOE
Mr. Andrew Wallo III, DOE
OAK RIDGE ASSOCIATED UNIVERSITIES

Oak Ridge Associated Universities (ORAU) is a private, not-for-profit consortium of 65 colleges and universities established in 1946 with a mission to provide and develop capabilities critical to the nation’s technology infrastructure, particularly in energy, education, health, and the environment.

ORAU’s Oak Ridge Institute for Science and Education (ORISE) was established by the U.S. Department of Energy to undertake national and international programs in science and engineering education, training and management systems, energy and environment systems, and medical sciences.

ORISE and its programs, such as the Science and Technology Policy Assistance Program, are operated by ORAU through a management and operating contract with the U.S. Department of Energy.

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Director

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Sr. Administrative Officer

Ms. Brenda J. Campbell
Program Assistant

Mr. Daniel J. Gallagher
Programmer/Analyst

Ms. Elcy Leshley
Office Assistant

Ms. Marsha M. March**
Mrs. Beryl L. Dowling
Secretary/Receptionist

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Sr. Science/Policy Advisor

Mr. David S. Smith
Technical Analyst

Ms. Diane S. Flack
Technical Advisor

Ms. Mary Grace L. Belcher
Program Associate

Ms. Delores M. Bigby
Technical Secretary

Ms. Merlene Burnham
Technical Secretary

** July 1, 1991 to December 1, 1992.
## CIRRPC MEETINGS
(July 1991-December 1992)

### 1991

<table>
<thead>
<tr>
<th>July</th>
<th>September</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Recommendations on Radiological Protection Subpanel</td>
<td>5-6 ORAU Panel on EM Health Effects</td>
</tr>
<tr>
<td>Science Panel</td>
<td>12 Recommendations on Radiological Protection Subpanel</td>
</tr>
<tr>
<td>2 Review Group—EPA Report on EMF and Carcinogenicity</td>
<td>16 Science Panel</td>
</tr>
<tr>
<td>14-19 HPS Summer School (at Georgetown University)</td>
<td>19 Executive Committee</td>
</tr>
<tr>
<td>26 Occupational Radiation Protection Research Subpanel</td>
<td><strong>October</strong></td>
</tr>
<tr>
<td>August</td>
<td></td>
</tr>
<tr>
<td>1 Executive Committee</td>
<td>10 Science Panel Executive Committee</td>
</tr>
<tr>
<td>5 Science Panel</td>
<td>16 Public Education Subpanel</td>
</tr>
<tr>
<td>16 Science Panel Executive Committee</td>
<td>17 Executive Committee</td>
</tr>
<tr>
<td>21 NARM Subpanel</td>
<td>20-21 ORAU Panel on EM Health Effects</td>
</tr>
<tr>
<td></td>
<td>28 Science Panel</td>
</tr>
</tbody>
</table>
November

6  Occupational Radiation Protection Research Subpanel
7  CIRRPC Policy
   Recommendations on Radiological Protection Subpanel
18-19 ORAU Panel on EM Health Effects
21  Science Panel Executive Committee

December

5  Occupational Radiation Protection Research Subpanel
   Executive Committee
18  Public Education Subpanel

1992

January

6  Science Panel
16  Science Panel Executive Committee
21  Recommendations on Radiological Protection Subpanel
22  Science Panel Executive Committee
   Executive Committee

February

3  Science Panel
5  Public Education Subpanel
10-12 Task Group on the Research Needs Relative to the Biological Effectiveness of Neutrons
18  EPA’s Proposed Drinking Water Regulations for Radionuclides Review Group
19  EPA’s Proposed Drinking Water Regulations for Radionuclides Review Group
   Executive Committee
   Science Panel Executive Committee
24-25 ORAU Panel on EM Health Effects
March

4 Neutron Quality Factor Writing Group

9 EPA's Proposed Drinking Water Regulations for Radionuclides Review Group

11 Ad Hoc Group to Develop Work Statement on Fluence-Based System of Radiation Risk Assessment

23-24 ORAU Panel on EM Health Effects

31 EPA's Proposed Drinking Water Regulations for Radionuclides Review Group

May

1 Neutron Quality Factor Writing Group

4 Health Effects of Electromagnetic Fields Subpanel

4 Science Panel (at AFFRI, Bethesda, Maryland)

19 ORAU Panel on EM Health Effects

21 Science Panel Executive Committee

June

2 Science Panel Executive Committee

6-9 "Internal Dosimetry Workshop" (Atlanta, Georgia) —conducted by the Occupational Radiation Protection Research Subpanel

13 Science Panel

14 Neutron Quality Factor Writing Group

23 Science Panel Executive Committee

July

6 Science Panel

8 Neutron Quality Factor Writing Group

15 Science Panel Executive Committee

Executive Committee
<table>
<thead>
<tr>
<th>August</th>
<th>November</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Science Panel</td>
</tr>
<tr>
<td>24</td>
<td>Neutron Quality Factor</td>
</tr>
<tr>
<td>19</td>
<td>Recommendations on Radio-</td>
</tr>
<tr>
<td>24</td>
<td>logical Protection Subpan-</td>
</tr>
<tr>
<td>4</td>
<td>Science Panel Executive</td>
</tr>
<tr>
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</tr>
<tr>
<td>17</td>
<td>Recommendations on Radio-</td>
</tr>
<tr>
<td>17</td>
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<tr>
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<td>Science Panel</td>
</tr>
<tr>
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<td></td>
</tr>
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</tr>
<tr>
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<td>Writing Group</td>
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<tr>
<td>19</td>
<td>Recommendations on Radio-</td>
</tr>
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APPENDIX F

REPORTS
1984-92

VA Assessment of Veterans with Military Service at Sites of Temporarily Augmented Ionizing Radiation (September 1984)

Review of the Draft Report of the National Institutes of Health Ad Hoc Working Group to Develop Radioepidemiological Tables (January 1985)

Review of the Report of the National Institutes of Health Ad Hoc Working Group to Develop Radioepidemiological Tables (January 1985)


International Activities Report (June 1986)

Radon Protection and Health Effects (August 1986)

SI Metric Radiation Units (December 1986)

Member Agency Participation in International Radiation Activities (Update: May 1987)


Federal Programs on Indoor Radon (April 1988)

Use of Probability of Causation by the Veterans Administration in the Adjudication of Claims of Injury Due to Exposure to Ionizing Radiation (August 1988)


Report of the CIRRPC Ad Hoc Planning Group (December 1988)
Report of the Executive Committee Regarding EPA NESHAP Regulations on Radionuclides for Medical Research Institutions and Radiopharmaceutical Manufacturers (June 1990)

Planning for Human Health Effects Research in the Event of a Nuclear Accident (June 1990)

Ionizing Radiation Risk Assessment (BEIR IV) (October 1991)

Health Effects of Low-Frequency Electric and Magnetic Fields (ORAU Report, June 1992)

Use of BEIR V and UNSCEAR 1988 in Radiation Risk Assessment: Lifetime Total Cancer Mortality Risk Estimates at Low Doses and Low Dose Rates for Low-LET Radiation (December 1992)