



# National Council on Radiation Protection and Measurements

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**Radiation Measurement**  
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May 5, 1998

Ms. Mary L. Thomas  
U.S. Nuclear Regulatory Commission  
Division of Contracts and Property Management  
Washington, DC 20551-0001

Dear Ms. Thomas:

Enclosed is a copy of a Comprehensive Technical Progress Report for all NCRP committees for the period of January 1, 1998 through March 31, 1998. Included in this report is a summary of the status of the project covered by NRC Grant No. 04 95 086, "Critical Evaluation of the Linear No-Threshold Assumption."

If you have any questions regarding this report, please contact Dr. Eric Kearsley at (301) 657-2652.

Sincerely,

William M. Beckner  
Executive Director

EEK/rym

Enclosures

cc: E. Kearsley  
C.B. Meinhold  
NRC Grant File

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**Progress Report**  
**NRC Grant No. 04 95 086**

Period covered by this report: January 1, 1998 to March 31, 1998

Activities reported on:

- Scientific Committee 1 - Basic Criteria, Epidemiology, Radiobiology and Risk
- Scientific Committee 1-4 - Extrapolation of Risks from Non-Human Experimental Systems to Man
- Scientific Committee 1-6 - Linearity of Dose Response
- Scientific Committee 1-7 - Information Needed to Make Radiation Protection Recommendations for Travel Beyond Low-Earth Orbit
- Scientific Committee 1-8 - Risk to Thyroid from Ionizing Radiation
- Scientific Committee 9 - Structural Shielding Design and Evaluation for Medical Use of X Rays and Gamma Rays of Energies up to 10 MeV
- Scientific Committee 46 - Operational Radiation Safety
- Scientific Committee 46-8 - Radiation Protection Design Guidelines for Particle Accelerator Facilities
- Scientific Committee 46-10 - Assessment of Occupational Doses from Internal Emitters
- Scientific Committee 46-11 - Radiation Protection During Special Medical Procedures
- Scientific Committee 46-13 - Design of Facilities for Medical Radiation Therapy
- Scientific Committee 57- Dosimetry and Metabolism of Radionuclides
- Scientific Committee 57-10 - Liver Cancer Risk
- Scientific Committee 57-14 - Placental Transfer Exposure of the Embryo/Fetus from Radionuclides in the Pregnant Woman
- Scientific Committee 57-15 - Uranium
- Scientific Committee 57-16 - Uncertainties in the Application of Metabolic Models
- Scientific Committee 57-17 - Radionuclide Dosimetry Models for Wounds
- Scientific Committee 64 - Environmental Issues
- Scientific Committee 64-17 - Uncertainty in Environmental Transport in the Absence of Site-Specific Data
- Scientific Committee 64-18 - Ecologic and Human Risks from Space Applications of Plutonium
- Scientific Committee 64-19 - Historical Dose
- Scientific Committee 64-20 - Contaminated Soil
- Scientific Committee 64-21 - Decontamination and Decommissioning of Facilities
- Scientific Committee 64-22 - Design of Effective Effluent and Environmental Monitoring Programs
- Scientific Committee 64-23 - Cesium in the Environment
- Scientific Committee 66 - Biological Effects and Exposure Criteria for Ultrasound
- Scientific Committee 72 - Radiation Protection in Mammography
- Scientific Committee 75 - Guidance on Radiation Received in Space Activities
- Scientific Committee 85 - Risk of Lung Cancer from Radon
- Scientific Committee 86 - "Hot Particles" in Eye, Ear, or Lung

- Scientific Committee 87 - Radioactive and Mixed Waste
- Scientific Committee 87-1 - Waste Avoidance and Volume Reduction
- Scientific Committee 87-2 - Waste Classification Based on Risk
- Scientific Committee 87-3 - Performance Assessment
- Scientific Committee 87-4 - Management of Waste Metals Containing Radioactivity
- Scientific Committee 88 - Fluence as the Basis for a Radiation Protection System for Astronauts
- Scientific Committee 89 - Nonionizing Electromagnetic Fields
- Scientific Committee 89-1 - Biological Effects of Magnetic Fields
- Scientific Committee 89-3 - Biological Effects of Extremely Low Frequency Electric and Magnetic Fields
- Scientific Committee 89-4 - Biological Effects and Exposure Recommendations for Modulated Radiofrequency Fields
- Scientific Committee 89-5 - Biological Effects and Exposure Criteria of Radiofrequency Fields
- Scientific Committee 91 - Radiation Protection in Medicine
- Scientific Committee 91-1 - Precautions in the Management of Patients Who Have Received Therapeutic Amounts of Radionuclides
- Scientific Committee 91-2 - Radiation Protection in Dentistry
- Scientific Committee 92 - Public Policy and Risk Communication
- Scientific Committee 93 - Radiation Measurement

**Status of funding for NRC Grant No. 04 95 086**

Total funding obligated:	\$ 225,000.00
Billings through March 31, 1998:	\$ 200,729.13
Funds remaining as of March 31, 1998:	\$ 24,270.87

## COMPREHENSIVE TECHNICAL PROGRESS REPORT

### January 1, 1998 to March 31, 1998

Some NCRP scientific committees have made limited progress because they have not been supported by a dedicated source of funding. Therefore, only the minimal funds from donations or non-targeted sources are available to support such committees. These committees are identified by an asterisk (\*) in this report.

#### Basic Criteria, Epidemiology, Radiobiology, and Risk

Scientific Committee 1 functions as the scientific program area committee for Basic Criteria, Epidemiology, Radiobiology, and Risk. Functioning within the scope of this Committee are four active report-writing committees: Scientific Committee 1-4 on Extrapolation of Risks from Non-Human Experimental Systems to Man, Scientific Committee 1-6 on Linearity of Dose Response, Scientific Committee 1-7 on Information Needed to Make Radiation Protection Recommendations for Travel Beyond Low-Earth Orbit, and Scientific Committee 1-8 on Risk to Thyroid from Ionizing Radiation. Scientific Committee 1-5 on Uncertainty in Risk Estimates has been moved to inactive status following the publication of NCRP Report No. 126, *Uncertainties in Fatal Cancer Risk Estimates Used in Radiation Protection* which is now available from NCRP publications for \$25.

Currently authorized but unfunded activities within this program area are:

- Assessment of Exposure from Radiation Therapy
- Symposium on Uncertainty in Risk Estimates
- Ethical Issues in Biomedical Research Involving the Exposure of Humans to Ionizing Radiation (joint with SC 91)

The Committee is currently examining the philosophical basis for radiation protection standards. In its December 17-18, 1997 meeting, with the assistance of Dr. Roger McClellan of the Chemical Industry Institute of Toxicology, the Committee reviewed the philosophy and various methodologies being used to establish exposure limits for hazardous chemicals.

The Committee has drafted a formal NCRP statement on the ALARA principle with the objective of providing guidance that would be helpful to managers of radiation protection programs in avoiding excessive costs associated with unreasonable applications of the ALARA principle in the workplace. The statement was sent to the Council for balloting and, implementing a new NCRP policy, it was also placed on the NCRP web site for public comment. The statement is still under review by the Council.

The membership of Scientific Committee 1 is as follows:

S.J. Adelstein, Chairman  
M.A. Bender  
B.B. Boecker  
R.J.M. Fry  
E.J. Hall  
K.R. Kase  
J.B. Little  
H. Royal  
R.E. Shore  
P. Slovic  
T.S. Tenforde  
W.K. Sinclair, Advisor  
E.E. Kearsley, NCRP Staff

Scientific Committee 1-4 is addressing the Extrapolation of Risks from Non-Human Experimental Systems to Man. This is to be an in-depth evaluation of the types of cancers that are associated with radiation exposure in various animals, their lifetime risks, and the methodology that might be used to extrapolate these risks to humans. The Committee met, probably for the last time, in March 1997. The Committee's draft report is very near completion. The Committee Chairman anticipates he can finish the report with one-on-one interaction with the individual Committee members. Their draft report is expected to enter the NCRP review process in 1998.

The Membership of Scientific Committee 1-4 is as follows:

D. Hoel, Chairman  
B. Carnes  
R. Dedrick  
D. Grahn  
W.C. Griffith  
P. Groer  
R.J. Preston  
R.J.M. Fry, Advisor  
T.M. Koval, NCRP Staff

Scientific Committee 1-6 on Linearity of Dose Response was established to make a critical examination of the scientific basis for the assumption of linearity of the human dose response curve for carcinogenesis in the region of low doses and dose rates. The Committee is systematically examining biological studies of the effects of ionizing radiation in the low-dose ( $<200$  mSv) and low-dose-rate ( $<10$  mSv  $\text{h}^{-1}$ ) region. A workshop was held at NCRP on 17 February, 1998. The distinguished speakers were: Dr. Myron Pollycove, Dr. Gayle Woloschak, Dr. Otto Raabe, Dr. Robert Ullrich, Dr. T.D. Luckey, Dr. Bernard Cohen,

and Dr. Jay Lubin. The first complete draft of the Committee's report will be assembled during the next quarter (April-June 1998).

The membership of Scientific Committee 1-6 is as follows:

A.C. Upton, Chairman  
S.J. Adelstein  
D. Brenner  
K.H. Clifton  
S.C. Finch  
E.J. Hall  
H.L. Liber  
R.B. Painter  
R.J. Preston  
R.E. Shore  
A. Kronenberg, Advisor  
E.E. Kearsley, NCRP Staff

Scientific Committee 1-7 on Information Needed to Make Radiation Protection Recommendations for Travel Beyond Low-Earth Orbit has held several meetings since January 1996. The Committee is identifying specific research that needs to be performed to acquire the data necessary to make radiation protection recommendations for humans working in deep space. The Committee will meet again in the next quarter and is expected to finish its first complete draft by that time.

The membership of Scientific Committee 1-7 is as follows:

L.W. Townsend, Chairman  
G.D. Badhwar  
E.A. Blakely  
L.A. Braby  
F.A. Cucinotta  
S.B. Curtis  
C.E. Land  
D.F. Smart  
R.J.M. Fry, Advisor  
E.E. Kearsley, NCRP Staff

Scientific Committee 1-8 on Risk to Thyroid from Ionizing Radiation is concerned with incidence and mortality risks from external irradiation as well as radioiodine exposures of the thyroid. The first meeting of the Committee was held at NCRP headquarters in Bethesda, Maryland on April 23, 1997. The Committee discussed its charge and the scope of the drafting effort. A second meeting was held on August 22, 1997. The Committee developed a working outline and initial drafting assignments were made.

The third meeting was held on January 9, 1998 where discussions continued and preliminary draft material was reviewed. The next meeting is scheduled for April 1998.

The membership of Scientific Committee 1-8 is as follows:

H.D. Royal, Chairman  
D. Becker  
A.B. Brill  
R.E. Shore  
R.M. Tuttle  
B.W. Wachholz  
D. Weber  
P.D. Zanzonico  
E. Ron, Advisor  
T.M. Koval, NCRP Staff

Scientific Committee 9 has essentially completed a draft report entitled *Structural Shielding For Diagnostic Medical X Ray Facilities*. The Report will contain an Executive Summary followed by an Introduction. There is an extensive section on Fundamentals of Diagnostic X Ray Shielding, a section on Elements of Shielding Design and, perhaps the most important section, Computation of Diagnostic Ray Shielding Requirements. There is a final section on Radiation Protection Surveys. The Executive Summary and a few details in the Radiation Protection Surveys section remain to be completed. The report will contain a Glossary and several Appendices.

There are no further meetings planned for the Committee and the Co-Chairmen are working to complete the report and enter it into the NCRP system for review. It is hoped that this review will be in progress before the next quarterly report is due.

The membership of Scientific Committee 9 is as follows:

B. Archer, Co-Chairman  
J.E. Gray, Co-Chairman  
R.L. Dixon  
W. Eide, Jr.  
L. Hubbard  
R.M. Quillin  
D. Shearer  
D.J. Simpkin  
J.S. Krohmer, Consultant  
A.K. Poznanski, Consultant  
J.A. Spahn, Jr., NCRP Staff

## Operational Radiation Safety

Scientific Committee 46\* is the NCRP scientific program area committee concerned with Operational Radiation Safety. Although the Committee is currently unfunded, it is actively engaged in preparing scope statements for future projects to be submitted for funding. The Committee has completed the revision of NCRP Report 59 entitled *Operational Radiation Safety Program* originally published in 1978. The new document will be published with the same title as Report No. 127 in the next quarter.

Currently authorized but unfunded activities within this program area are:

- Air Monitoring
- Design of Facilities and Installed Equipment for Handling Unsealed Radioactive Materials
- Design Guidelines for Nuclear Medicine Facilities
- Radiation Exposures Resulting from Air Travel
- Radiation Protection Guidelines for Industrial Radiation Facilities
- Radiation Protection and Control Issues Involved in the Deliberate or Accidental Detonation of Nuclear Weapons and Dispersal of Radioactive Material (joint effort with SC 64)
- Revised Guidance on Radiation Protection in Veterinary Medicine

At its most recent meeting on March 30-31, the Committee identified many new efforts for which the members will draft statements of work that will be submitted to the NCRP Board of Directors. These include: Criteria for Unrestricted Release of Radioactive Material, Guidelines for Performing Radiation Protection Self Assessments, Balancing Worker Risks and Public Safety in Environmental Remediation, Determining Effective Dose Equivalent from Personal Dosimetry Measurements, Investigation and Reporting of Radiological Incidents, Safe Use of Ultraviolet Sources, and Safe Use of Radiation Sources for Gauging. The Committee also discussed preparing a revision to NCRP Report 71, *Operational Radiation Safety Training*.

Functioning within the scope of this Committee are four report-writing committees: Scientific Committee 46-8\* on Radiation Protection and Design Guidelines for Particle Accelerator Facilities, Scientific Committee 46-10\* on Assessment of Occupational Doses from Internal Emitters, Scientific Committee 46-11\* on Radiation Protection During Special Medical Procedures, and Scientific Committee 46-13\* on Design of Facilities for Medical Radiation Therapy.

The membership of Scientific Committee 46\* is as follows:

K.R. Kase, Chairman  
J.W. Baum  
J.P. Davis  
S.M. Garry  
D.C. Hall  
K.A. Higley  
S. Langhorst  
K.L. Miller  
D.S. Myers  
J. Poston, Sr.  
P. Voillequé  
E.E. Kearsley, NCRP Staff

Scientific Committee 46-8\* on Radiation Protection Design Guidelines for Particle Accelerator Facilities has prepared a draft report which is currently being revised for review by the NCRP. This report will be a complete stand-alone revision of NCRP Report No. 51 which was published in 1977. By "stand alone" it is meant that all pertinent reference material is included in the text. The draft report is expected to be ready for Council review in mid-1998.

The membership of Scientific Committee 46-8\* is as follows:

R.H. Thomas, Chairman  
W.R. Casey  
J.D. Cossairt  
K. O'Brien  
N. Rohrig  
L.A. Slaback  
G. Stapleton  
D.R. Perry, Advisor  
T.M. Koval, NCRP Staff

Scientific Committee 46-10\* on Assessment of Occupational Doses from Internal Emitters, although currently restricted by funding constraints, is preparing a final draft report for review by the Council. The report addresses two major issues of importance to the assessment of internal dose. First, the report provides additional guidance for interpreting bioassay measurements and estimating intakes. Second, the report addresses problems that have arisen as a result of the evolution of radiation protection quantities and units that have been introduced in recent years. Comments received on this draft are being addressed by the Committee. The revised report approved by the Council will then be submitted for publication.

The membership of Scientific Committee 46-10\* is as follows:

D.R. Fisher, Chairman  
A.R. Benedetto  
C.D. Berger  
J.W. Poston, Sr.  
K.W. Skrable  
D. Myers, Liaison  
E.E. Kearsley, NCRP Staff

The draft report of Scientific Committee 46-11\* on Radiation Protection During Special Medical Procedures has essentially completed work on a draft report entitled *Radiation Protection of Clinical Staff Involved in Special Medical Procedures*. Still remaining to be completed by the chairman are several tables and graphs. The report should be ready for printing in three months.

The membership of Scientific Committee 46-11\* is as follows:

D.R. Shearer, Chairman  
L.F. Brateman  
D.P. Harrington  
M.E. Masterson  
R.C. Murry  
J.A. Spahn, Jr., NCRP Staff

Scientific Committee 46-13 on Design of Facilities for Medical Radiation Therapy meets together annually and by teleconference monthly. The need for this Committee arose when Scientific Committee 9, charged to rewrite NCRP Report No. 49, Structural Shielding Design and Evaluation for Medical Use of X Rays and Gamma Rays of Energies Up to 10 MeV, made the decision to limit their report to diagnostic x-ray facilities. This left the design of medical radiation therapy facilities to be covered by this Committee. In order to do their job completely it was necessary that they rewrite the pertinent parts of NCRP Reports 49, 51 and 79 and consolidate them into a single therapy shielding report. They are making steady progress and are involving the medical physics and health physics communities in the process.

The membership of Scientific Committee 46-13\* is as follows:

J.A. Deye, Chairman  
P.J. Biggs  
J. Kleck  
R.C. McCall  
P.H. McGinly  
J.E. Rodgers  
R.K. Wu  
M. Edwards, SC 46 Liaison  
K. Kase, SC 46 Liaison  
R.O. Gorson, Consultant  
J.A. Spahn, Jr., NCRP Staff

#### Dosimetry and Metabolism of Radionuclides

Scientific Committee 57\* is the NCRP scientific program area committee concerned with Dosimetry and Metabolism of Radionuclides. This Committee last met on March 6, 1997 to discuss progress on NCRP committees in this program area and discuss issues for consideration for future NCRP activities. Functioning within the scope of this Committee are five report-writing committees: Scientific Committee 57-10\* on Liver Cancer Risk, Scientific Committee 57-14 on Placental Transfer, Scientific Committee 57-15\* on Uranium, Scientific Committee 57-16\* on Uncertainties in the Application of Metabolic Models, and Scientific Committee 57-17 on Radionuclide Dosimetry Models for Wounds.

The membership of Scientific Committee 57\* is as follows:

B.B. Boecker, Chairman  
K.F. Eckerman, Vice Chairman  
J.N. Stannard, Chairman Emeritus  
M. Bhattacharyya  
R.A. Guilmette  
J.R. Johnson  
R.W. Leggett  
R.G. Thomas  
D.A. Weber  
T.M. Koval, NCRP Staff

Scientific Committee 57-10\* on Liver Cancer Risk is evaluating the risk to the liver from internal emitters and is nearing the initial review stage. A draft to be sent to critical reviewers is currently being finalized at the NCRP and is expected to be mailed by summer 1998.

The membership of Scientific Committee 57-10\* is as follows:

A.L. Brooks, Co-Chairman  
G.N. Taylor, Co-Chairman  
S. Benjamin  
G. van Kaick  
K. Wegener  
H. Wesch  
T.M. Koval, NCRP Staff

Scientific Committee 57-14 on Exposure of the Embryo/Fetus from Radionuclides in the Pregnant Woman is concerned with the radiation dose to the embryo/fetus resulting from the placental transfer of a radionuclide from a pregnant woman to the conceptus. A draft report has undergone review by the Council and is currently being revised based on the comments received. It is anticipated that the revision will be completed and the report published in 1998.

The membership of Scientific Committee 57-14 is as follows:

M.R. Sikov, Chairman  
J.S. Robertson  
E.E. Watson  
A.V. Wegst  
K.F. Eckerman, Consultant  
T.M. Koval, NCRP Staff

Scientific Committee 57-15\* on Uranium is re-examining uranium in terms of its chemical and radiotoxicity. A draft report is being revised based on NCRP critical review comments and is expected to go to the Council for review sometime in 1998. A delay in getting the report to the Council review stage has resulted from the time required to modify the model used in the report. This has been completed and other sections of the draft are now being updated.

The membership of Scientific Committee 57-15\* is as follows:

J.R. Johnson, Chairman  
B.B. Boecker  
J.S. Bogard  
L.W. Cole  
A.F. Eidson  
E.C. Foulkes  
S.A. Fry  
T.M. Koval, NCRP Staff

Scientific Committee 57-16\* on Uncertainties in the Application of Metabolic Models has completed its drafting efforts and a printer's manuscript of the commentary is currently being prepared for publication.

The membership of Scientific Committee 57-16\* is as follows:

A. Bouville, Chairman  
K.F. Eckerman  
W.C. Griffith  
F.O. Hoffman  
R.W. Leggett  
J. Stubbs  
E.I. White, NCRP Staff

Scientific Committee 57-17 on a Radionuclide Dosimetry Model for Wounds will focus on developing a model for determining doses from various types of radionuclide-contaminated wounds. The Committee had its initial meeting in November 1997 and a second meeting in February 1998. A third meeting is scheduled for June 1998 in Baltimore to allow Dr. McDiarmid to attend to present information regarding human wounds contaminated with depleted uranium.

The membership of Scientific Committee 57-17 is as follows:

B.D. Breitenstein, Jr.  
E.G. Daxon  
P.W. Durbin  
R.E. Goans  
R. Guilmette  
J.J. Russell  
R.E. Toohey  
R. Clark, Advisor  
J. Piechowski, Adviser  
M. McDiarmid, Consultant  
T.M. Koval, NCRP Staff

## Environmental Issues

Scientific Committee 64\* is the NCRP scientific program area committee concerned with Environmental Issues. Functioning in the Scientific Committee 64\* area are Scientific Committee 64-17\* on Uncertainty in Environmental Transport in the Absence of Site-Specific Data, Scientific Committee 64-18\* on Ecologic and Human Risks from Space Applications of Plutonium, Scientific Committee 64-19\* on Historical Dose, Scientific Committee 64-20\* on Contaminated Soil, Scientific Committee 64-21\* on Decontamination and Decommissioning of Facilities, Scientific Committee 64-22 on Design of Effective Effluent and Environmental Monitoring Programs, and Scientific Committee 64-23 on Cesium in the Environment. Scientific Committee 64\* had a meeting in February 1997 in Austin, Texas at which the Committee reviewed the program and developed new projects, several of which have been submitted to the NCRP Board of Directors for approval.

Currently authorized but unfunded activities within this program area are:

- Benchmarks for Ecological Risks
- Contaminated Ecosystems: Remediation or Management?
- Radiation Protection and Control Issues Involved in Deliberate or Accidental Detonation of Nuclear Weapons and Dispersal of Radioactive Weapons (joint with SC 46)
- Symposium on Comparison of Methods for Estimating Radiological and Chemical Risks
- Usage Factors for Environmental Dose Calculations

The membership of Scientific Committee 64\* is as follows:

J.E. Till, Chairman  
L.R. Anspaugh, Vice Chairman  
M.W. Carter, Chairman Emeritus  
F.J. Congel  
T.V. Crawford  
E.G. dePlanque  
K.F. Eckerman  
H. Grogan  
F.O. Hoffman  
R. Jaquish  
B. Kahn  
C. Whipple  
E.I. White, NCRP Staff

Scientific Committee 64-17\* on Uncertainty in Environmental Transport in the Absence of Site-Specific Data completed a commentary which was published as NCRP Commentary 14 in 1996. Because of the importance of the subject matter, and on approval of the NCRP Board of Directors, the previously published Commentary has undergone review by the Council, is currently undergoing revision based on Council member

comments, and is to be published as an NCRP report.

The membership of Scientific Committee 64-17\* is as follows:

F.O. Hoffman, Chairman  
D.E. Burmaster  
W.J. Conover  
R.O. Gilbert  
G. Morgan  
W. Rish  
D. Waite  
T. Barry, Consultant  
M. Cullahan, Consultant  
R. Whitfield, Consultant  
E.I. White, NCRP Staff

Scientific Committee 64-18\* on Ecologic and Human Risks from Space Applications of Plutonium has completed a draft of their report and the report is currently being revised after Council review. If funding is obtained, it is anticipated that the report will be published by early 1999. No further meetings are scheduled.

The membership of Scientific Committee 64-18\* is as follows:

R. Guilmette, Chairman  
F. Gelbard  
W. Hansen  
W.C. Inkret  
B.A. Muggenburg  
J.W. Poston  
W.L. Robison  
G.L. Voelz  
J.R. Trabalka, Advisor  
E.I. White, NCRP Staff

Scientific Committee 64-19\* on Historical Dose is working on a draft report with the first draft due in 1998. No meetings are currently scheduled.

The membership of Scientific Committee 64-19\* is as follows:

J.E. Till, Chairman  
A. Bouville  
H.A. Grogan  
G.R. Howe  
T.B. Kirchner  
K.J. Kopecky  
K.R. Meyer  
P. Voillequé  
C. Miller, Consultant  
P. Garbe, Consultant  
M. Balonov, Advisor  
E.I. White, NCRP Staff

Scientific Committee 64-20\* on Contaminated Soil addresses scenarios leading to soil contamination, migration pathways, exposure pathways, and contamination limits. A printer's manuscript is currently being prepared. The report should be published in 1998.

The membership of Scientific Committee 64-20\* is as follows:

H.L. Beck, Chairman  
D. Baker  
A. Bouville  
F.O. Hoffman  
W.L. Robison  
J.H. Shinn  
S.L. Simon  
E.I. White, NCRP Staff

Scientific Committee 64-21\* on Decontamination and Decommissioning of Facilities will treat surface contamination of objects such as buildings, equipment, tools, clothing and other materials. This Committee has not yet had its first meeting and the scope is being revised to reflect current concerns in this area.

The membership of Scientific Committee 64-21\* is as follows:

W.E. Kennedy, Jr., Chairman  
F.P. Crimi  
K.J. Eger  
K.A. Higley  
S. Wiltshire  
D. Layton, Advisor  
E.I. White, NCRP Staff

Scientific Committee 64-22 on Design of Effective Effluent and Environmental Monitoring Programs had its first meeting in May 1997 where an outline was developed and writing assignments were made. A second meeting was held in August where the outline was modified and drafting assignments were extended. A third meeting was held in November 1997. The next meeting is to be held in May 1998 to review drafted material.

The membership of Scientific Committee 64-22 is as follows:

B. Kahn, Chairman  
J.D. Berger  
B. Franke  
J. Glissmeyer  
C.V. Gogolak  
N. Golchert  
R.E. Jaquish  
J.A. Johnson  
S.K. Nair  
E.I. White, NCRP Staff

Scientific Committee 64-23 on Cesium in the Environment had its first meeting in June where an outline was developed and writing assignments were made. The second meeting was held in October 1997. A third meeting occurred in January 1998 where the draft was reviewed and assignments extended. The next meeting is scheduled for May 1998.

The membership of Scientific Committee 64-23 is as follows:

F.W. Whicker, Chairman  
C.T. Garten, Jr.  
D.M. Hamby  
K.A. Higley  
T.G. Hinton  
D.J. Rowan  
R.G. Schreckhise  
E.I. White, NCRP Staff

Scientific Committee 66 on Biological Effects and Exposure Criteria for Ultrasound is examining exposure criteria based on all known mechanisms of interaction of ultrasound with tissue. Scientific Committee 66 has completed work on the body of the report except for Conclusions and Recommendations, which have been heavily discussed and debated over the last six months in monthly two-hour teleconferences. All members have participated in all teleconferences. The Committee expects to complete deliberations within the next two to three months, at which time the report will be turned over to the NCRP to begin the review process.

The membership of Scientific Committee 66 is as follows:

W.L. Nyborg, Chairman  
P.L. Carson  
E.L. Carstensen  
F. Dunn  
D.L. Miller  
M.W. Miller  
H.E. Thompson  
M.C. Ziskin  
R.F. Apfel, Consultant  
L.A. Crum, Consultant  
C.C. Church, Consultant  
J.A. Spahn, Jr., NCRP Staff

Scientific Committee 72 on Radiation Protection in Mammography has prepared a draft report which updates NCRP Report No. 85, *Mammography — A User's Guide*. The Committee is in the final stages of completing a report which will review and discuss all of the technical improvements in equipment and technique, the effect of MQSA on the quality of mammograms and their interpretation, and a complete review of the literature on the risks and benefits of mammography. It is hoped that the report will be ready for review by the NCRP Council in 1998.

The membership of Scientific Committee 72 is as follows:

L.N. Rothenberg, Chairman  
S.A. Feig  
A.G. Haus  
R.E. Hendrick  
G.R. Howe  
J.L. McCrohan  
E.A. Sickles  
M. Yaffe  
W.W. Young  
J.A. Spahn, Jr., NCRP Staff

Scientific Committee 75\* is responsible for the preparation of a Report to replace NCRP Report No. 98, *Guidance on Radiation Received in Space Activities*. This new report updates the material published in Report 98, incorporates new risk coefficients for human exposures, and significantly expands the summary of radiobiology of heavy charged particles. The report is currently being prepared for concurrent critical and Council review.

The membership of Scientific Committee 75\* is as follows:

R.J.M. Fry, Chairman  
E.J. Ainsworth  
E.A. Blakely  
J.D. Boice, Jr.  
S.B. Curtis  
C.E. Land  
D.E. Robbins  
W.K. Sinclair  
L.W. Townsend  
M.L. Meistrich, Advisor  
E.E. Kearsley, NCRP Staff

Scientific Committee 85\* is completely rewriting NCRP Report No. 78, *Evaluation of Occupational and Environmental Exposures to Radon and Radon Daughters in the United States*. Since Report No. 78 was published, significant new data and reviews have become available. These include the NAS/NRC BEIR IV report and the NAS/NRC BEIR VI report. The draft report of Scientific Committee 85\* is currently being prepared for review.

The membership of Scientific Committee 85\* is as follows:

N.H. Harley, Chairman  
D.B. Chambers  
F.T. Cross  
H. Evans  
A. Goodwin  
J.H. Lubin  
J. Neuberger  
J.B. Schoenberg  
E.S. Robbins, Consultant  
P. Groer, Advisor  
H.L. Kusnetz, Advisor  
E.E. Kearsley, NCRP Staff

Scientific Committee 86\* is responsible for the preparation of an NCRP Report on Hot Particles. The Committee's draft report has been reviewed by the Council and is currently being revised to address comments received. The report will replace NCRP Report No. 106, *Limit for Exposure to "Hot Particles" on the Skin* and extends NCRP recommendations to address "hot particle" irradiations involving the ear, eye, respiratory and gastrointestinal systems as well as addressing lower energy beta emitters and hot particles on the skin.

The membership of Scientific Committee 86\* is as follows:

T.F. Gesell, Chairman  
J.W. Baum  
J.W. Hopewell  
M.W. Lantz  
J.W. Osborne  
B. Scott  
S. Seltzer  
R.E. Shore  
B.V. Worgul  
W.D. Reece, Consultant  
M.J. Scannell, Consultant  
W.M. Beckner, NCRP Staff

#### Radioactive and Mixed Waste

Scientific Committee 87\* is the NCRP scientific program area committee concerned with Radioactive and Mixed Waste. Functioning under this area are Scientific Committees 87-1\* on Waste Avoidance and Volume Reduction, Scientific Committee 87-2\* on Waste Classification Based on Risk, Scientific Committee 87-3\* on Performance Assessment, and the newly formed Scientific Committee 87-4 on Management of Waste Metals Containing Radioactivity.

A currently authorized but unfunded activity within this program area is:

- Management of Large-Volume/Low-Activity Waste

The membership of Scientific Committee 87\* is as follows:

D.G. Jacobs, Chairman  
A.G. Croff  
W. Dornsife  
L.D. Eyman  
M.W. Kozak  
D.W. Moeller  
M.T. Ryan  
S. Wiltshire  
E.I. White, NCRP Staff

Scientific Committee 87-1\* on Waste Avoidance and Volume Reduction is assessing methods for institutional users of radioactivity to minimize the amount of waste sent for disposal. The Committee recently held a teleconference to discuss the draft and is presently making final revisions to the report which should enter the Council review process in 1998.

The membership of Scientific Committee 87-1\* is as follows:

W.P. Dornsife, Chairman  
R. Garcia  
F.X. Masse  
J. Psaras  
E.H. Rau  
A. Wolbarst  
W. Hipsher, Consultant  
E.I. White, NCRP Staff

Scientific Committee 87-2\* on Waste Classification Based on Risk is developing a scheme which classifies both radioactive and chemical wastes on a common basis. The Committee's draft report is in critical review. Some additional funding is expected which will allow the Committee to meet to revise the draft based on reviewers' comments.

The membership of Scientific Committee 87-2\* is as follows:

A.G. Croff, Chairman  
M.J. Bell  
Y. Cohen  
L.C. Keifer  
D.C. Kocher  
D.J. Paustenbach  
V.C. Rogers  
A. Wallo  
E.I. White, NCRP Staff

Scientific Committee 87-3\* on Performance Assessment is examining the performance of low-level radioactive waste disposal systems. The Committee is in the late stage of preparing a draft for Council review.

The membership of Scientific Committee 87-3\* is as follows:

M.W. Kozak, Chairman  
W.E. Kennedy  
D.C. Kocher  
R.R. Seitz  
T. Sullivan  
V.C. Rogers  
E.I. White, NCRP Staff

Scientific Committee 87-4 on Management of Waste Metals Containing Radioactivity is in the early stages of its work. The first meeting of this Committee was held in August 1997 where a preliminary outline was developed and drafting assignments

were made. The second meeting was held in October 1997 and a third meeting was held in December 1997. The main purpose of the third meeting was to visit a steel mill to observe first hand the detection equipment and methods in place to assure compliance with radioactive contamination goals in waste metals. The Committee is currently finishing the draft of their comments on the EPA technical support document on recycling of waste metals and the draft is expected to go to the NCRP president in May 1998 and the EPA in June 1998.

Funding is now being sought to support this Committee's activities for the publication of an NCRP scientific report on the Management of Waste Materials Containing Radioactivity.

The membership of Scientific Committee 87-4 is as follows:

S.Y. Chen, Chairman  
A. LaMastra  
C. Massey  
H.R. Meyer  
D.W. Moeller  
D.J. Strom  
J.G. Yusko  
J.O. Lubenau, Advisor  
M.T. Ryan, Advisor  
E.I. White, NCRP Staff

Scientific Committee 88 is responsible for the preparation of an NCRP Report on Fluence as the Basis for a Radiation Protection System for Astronauts. The Committee has concluded that there is not sufficient justification to recommend change from the current system to either a microdosimetry- or fluence-based system for managing or assessing space radiation hazards. The Committee's draft report is being prepared for critical and Council review concurrently.

The membership of Scientific Committee 88 is as follows:

S.B. Curtis, Chairman  
L.A. Braby  
J.F. Dicello  
M.N. Gould  
P. Groer  
W.K. Sinclair  
M.A. Zaider  
R.J.M. Fry, Advisor  
E.E. Kearsley, NCRP Staff

## Nonionizing Radiation

Scientific Committee 89\* is an NCRP program area committee on Nonionizing Electromagnetic Fields. The Committee is responsible for advising the NCRP Board of Directors on matters in this area. Functioning within the scope of this Committee are three report-writing committees: Scientific Committee 89-3 on Biological Effects of Extremely Low Frequency Electric and Magnetic Fields, Scientific Committee 89-4\* on Biological Effects and Exposure Recommendations for Modulated Radiofrequency Fields, and Scientific Committee 89-5\* on Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields.

A currently authorized but unfunded activity within this program area is:

- Effects of Exposure to Ultraviolet Radiation

The membership of Scientific Committee 89\* is as follows:

T.S. Tenforde, Chairman  
A.W. Guy  
J.E. Cleaver  
D. Hoel  
J.C. Lin  
D.H. Sliney  
J.A.J. Stolwijk  
R.A. Tell  
M. C. Ziskin  
T.M. Koval, NCRP Staff

Scientific Committee 89-3 on Biological Effects of Extremely Low Frequency Electric and Magnetic Fields is summarizing the biological effects of ELF fields and is currently revising a draft report in response to comments received from the NCRP critical review process. When revisions are completed, the draft will be forwarded to the full Council for review.

The membership of Scientific Committee 89-3 is as follows:

W.R. Adey, Chairman  
L.A. Anderson  
C.F. Blackman  
D.O. Carpenter  
W.E. Feero  
M. Frazier  
R.H. Lovely  
R.A. Luben  
M. Misakian  
M.E. O'Connor  
R.G. Stevens  
C.F. Ehret, Advisor  
K.R. Groh, Advisor  
J.E. Morris, Consultant  
C.J. Maletskos, NCRP Staff

Scientific Committee 89-4\* on Biological Effects and Exposure Recommendations for Modulated Radiofrequency Fields had four meetings through mid-1996. Due in part to uncertainties regarding the continued funding of this project, no meetings have occurred since then and the Committee has communicated primarily by e-mail. Preliminary drafts of material have been circulated to members for review and comment during the past few months with the hope that a completed draft can be obtained by the summer of 1998.

The membership of Scientific Committee 89-4\* is as follows:

O. Gandhi, Chairman  
J. D'Andrea  
K. R. Foster  
A.W. Guy  
D.R. Justesen  
I. Nair  
A.R. Sheppard  
T.M. Koval, NCRP Staff

Scientific Committee 89-5\* is working on an NCRP report on Biological Effects and Exposure Criteria of Radiofrequency Electromagnetic Fields. The Committee is currently in the midst of drafting initial versions of sections. When completed, this report will replace NCRP Report No. 86. The next meeting of the Committee is scheduled for May 1998. It is anticipated that a completed draft of the report will be ready for review by the beginning of 1999.

The membership of Scientific Committee 89-5\* is as follows:

J. Lin, Chairman  
C.K. Chou, Vice Chairman  
E. Adair  
P. Buffler  
G.H. Harrison  
W.G. Lotz  
R.A. Luben  
J.A.J. Stolwijk  
T.M. Koval, NCRP Staff

### Radiation Protection in Medicine

Scientific Committee 91\* on Radiation Protection in Medicine has met annually since its formation in 1993. This Committee was formed to manage the efforts of the NCRP to prepare recommendations for radiation protection in medical applications. Two committees, reported on below, are actively engaged in preparing such recommendations in nuclear medicine and dentistry. The Committee at its next meeting is preparing to meet with the various organizations serving the professional communities which actively use radiation in medicine. The purpose of the meeting is to determine what more the NCRP can be doing to be of service to these communities.

Currently authorized but unfunded activities within this program area are:

- Medical Evaluation of Workers
- Assessment of Exposure from Therapy
- Ethical Issues in Biomedical Research Involving the Exposure of Humans to Ionizing Radiation (joint with SC 1)

The membership of Scientific Committee 91\* is as follows:

F.A. Mettler, Chairman  
J.W. Brand  
J.T. Bushberg  
S. Donaldson  
M. Edwards  
H.C. Redman  
H.D. Royal  
J.A. Seibert  
M.J. Siegel  
D.M. Twickler  
J.A. Spahn, NCRP Staff

Scientific Committee 91-1 on Precautions in the Management of Patients Who Have Received Therapeutic Amounts of Radionuclides is expected to have a full draft in the next month. This is not a draft ready for review but it will be distributed to members of the Committee and its advisers and consultants for comments and suggestions for improvement. It is anticipated that the report will be submitted for review by the Council later in 1998.

The membership of Scientific Committee 91-1 is as follows:

J. St. Germain, Chairman  
E.B. Silberstein  
J.F. Williamson  
P. Zanzonico  
R.J. Vetter, Consultant  
J.T. Bushberg, Liaison  
S. Donaldson, Liaison  
J.A. Spahn, Jr., NCRP Staff

Scientific Committee 91-2\* is charged with rewriting NCRP Report No. 35 on Dental X-Ray Protection. A draft report is nearing completion and should be ready to enter the review process in 1998. Most of the work on revising the report is being conducted by email.

The membership of Scientific Committee 91-2\* is as follows:

J.W. Brand, Chairman  
M. Edwards  
S.J. Gibbs  
J.O. Katz  
A.G. Lurie  
S.C. White  
J.A. Spahn, NCRP Staff

#### Public Policy and Risk Communication

Scientific Committee 92\* is an NCRP program area committee on Public Policy and Risk Communication. This Committee is responsible for advising the NCRP Board of Directors on matters in this area. The Committee has not been active in the time period covered by this report.

A currently authorized but unfunded activity within this program area is:

- Allocation of Resources to Obtain Optimal Dose Reduction

The membership of Scientific Committee 92\* is as follows:

P. Slovic, Chairman  
K. Florig  
W. Hendee  
S. Jasanoff  
A. Upton  
C. Whipple  
S. Wiltshire  
E.E. Kearsley, NCRP Staff

### Radiation Measurement

Scientific Committee 93\* is an NCRP program area committee on Radiation Measurement. The Committee is responsible for advising the NCRP Board of Directors on matters in this area. Although no report-writing committees are currently functioning within this area, potential topics have been discussed.

Currently authorized but unfunded activities within this program area are:

- Update of NCRP Report No. 58, *Handbook of Radioactivity Measurements*
- Biological Dosimetry
- Guidance on Measurements for Quality Assurance and Verification for Conformal Radiation Therapy
- Aerosol Measurements
- Radiation Measurement Accuracy
- Background Levels of Radionuclides in the Environment

The membership of Scientific Committee 93\* is as follows:

H.L. Beck, Chairman  
L. Braby  
P. DeLuca  
J. Dicello  
F.M. Dietrich  
N. Harley  
G. Knoll  
A. Lucas  
T. Straume  
C.J. Maletskos, NCRP Staff

Note: The National Council on Radiation Protection and Measurements (NCRP) has historically limited its Scientific Committee efforts to the publication of reports, commentaries and statements. Now, on a trial basis, the NCRP is engaged in providing

scientific review of the background information to be used by an agency for rule making. The result will be a letter report to the agency from the President of the NCRP concerning the accuracy of the data, validity of assumptions, and overall usefulness of the background information for the intended use. Advice or recommendations regarding the proposed rule making will not be provided. These activities will be carried out by a duly constituted NCRP scientific committee. It is expected, in most cases, the scientific committee performing such a review would later be funded to draft an NCRP document which would provide general guidance on the given subject to the radiation protection community at large.