

CURRICULUM VITAE

OF

ALLEN BRODSKY, Sc.D., CHP, CIH, DABR

July 30, 2006

EDUCATION

B.E. in chemical engineering, 1949, The Johns Hopkins University.

Atomic Energy Commission-National Research Council Radiological Physics Fellowship, 1949-50, Health Physics Division, Oak Ridge National Laboratory.

M.A. in physics, 1961, The Johns Hopkins University. (Thesis title: "The Pulse Distributions in Stilbene Produced by 1-15 MeV Neutrons, Corrected for End Effect.")

Sc.D. (Hyg.) In biostatistics and radiation health, 1966, University of Pittsburgh. (Dissertation title: "A Stochastic Model of Tumor Induction, as Applied to Skin Tumors in Mice.")

Commission, 2nd Lt., Corps of Engineers, Army of the United States, June 1949. ROTC and Army Reserve courses included instruction on leadership principles, command and control of armed forces, logistics and supply, planning and construction of roads and bridges and combat tactics.

Certified in Health Physics, American Board of Health Physics, 1960 (No. 60-101); recertified 1981, 1985, 1996, 2000, 2004.

Certified, Radiological Aspects, American Board of Industrial Hygiene, 1966; recertified 1986, 1990, 1996, 2002.

Certified, Therapeutic Radiological Physics, American Board of Radiology, 1975.

EXPERIENCE

9/97-3/06. *Senior Scientist, Science Applications International Corporation (SAIC), McLean, VA. Perform reconstructions of doses to veterans exposed to radiation during nuclear weapons tests. Write "Fact Sheets" to explain radiation risks. Perform consulting services on radiation protection requirements for various installations. Carry out development of statistical methods of data analysis as needed to support fission track analysis of plutonium in urine and other projects. Develop mathematical algorithms for external and internal dose calculations.*

7/86-present. *Adjunct Professor, Department of Radiation Science, Georgetown University. Teach fundamentals of radiation dosimetry and health physics, and advise graduate students on thesis projects.*

7/86 - 8/97, private consultant. Provided consultation and services in radiation protection, radiological physics, environmental analyses, statistics of radiation measurements, analytical radiobioassay and program quality assurance, research planning and evaluation, program auditing, and decommissioning. Completed audit of Department of Agriculture's nationwide Radiation Safety Program as Project Director, for JUPITER Corporation. Carried out nationwide study of radiation safety training requirements for medical institutions for NRC through SCA, Inc. Performed audit of Yale University medical center radiation safety program with team of three other professors. Performed study of emergency contamination and internal dose indices for NRC through Brookhaven National Laboratory. Performed review of radiation risks, uranium toxicity and cost-benefit of further decontamination of Watertown Arsenal for Army Research Laboratory. Also taught at Georgetown University.

7/75-7/86 - Senior Health Physicist, Radiation Risk Assessment and Management Branch, Office of Nuclear Regulatory Research (formerly Occupational Health Standards Branch, and Occupational Radiation Protection Branch, Office of Standards Development, U.S. Nuclear Regulatory Commission, Washington, DC 20555)

Developed and wrote guidance for radiation safety programs, procedures and training in medical and academic institutions, and in industries using radioactive materials. Worked on American National Standards Institute working groups (sponsored by Health Physics Society) on bioassay for tritium, bioassay for fission and activation products, bioassay for plutonium and bioassay performance criteria. Developed guidance on radiation safety programs for pharmaceutical companies. Served as NRC representative to ANSI N44 Committee, Equipment and Materials for Medical Radiation Applications. Individual member, Radiation Safety Committee, American Association of Physicists in Medicine (AAPM), 1975-76. Individual member, Legislation and Regulations Committee, AAPM, 1976. Prepared evaluations of environmental and population effects of plutonium and fission product dispersal, radon emission, and tritium and C-14 dispersal, in response to letter requests for information, and in preparation of testimony for Clinch River Breeder Reactor hearings. Served as member of ad hoc task group to review paper by Mancuso, Stewart, and Kneale on analysis of Hanford mortality data on radiation workers. Project manager on a number of NRC research contracts. Evaluated internal exposures of licensee employees on request. Initiated and managed applied research projects of contractors to improve bioassay and dose assessment methods. Derived statistical and radiation protection criteria for establishing performance standards for radiochemical analysis and laboratory accreditation. Audited bioassay and air monitoring programs of a nuclear fuel facility. Assigned as Program Manager, Radiation Risk Management Program in January 1986. Also, assigned in December 1985 to revise the basic radiation safety regulation, 10 CFR Part 20, "Standards for Protection Against Radiation," to incorporate public comments. Took early retirement in 1986.

3/71-6/75 - Radiological Physicist and Radiation Safety Officer, Division of Radiation Therapy, Department of Radiology, Mercy Hospital, Pittsburgh, PA 15219.

Served as radiation therapy physicist in Division of Radiation Therapy. Served also as Radiation Safety Officer under Director of Nuclear Medicine. Performed exposure and dose-rate calibrations and developed patient set-up equations and procedures for radiation therapy sources including Picker Co-60 and new Theratron 4-MV CLINAC linear accelerator sources, 200 KVp and 50 KVP x-ray therapy machines, new Philips RT-70 x-ray therapy machine, and intracavitary Cs-137 and Ra-226 applicators. Set-up routine dosimetric and maintenance procedures for clinical use of sources in brachytherapy.

Established procedures for routine fluoroscope checks, hospital radiation safety surveillance, including hazard evaluations for new research or clinical uses of radionuclides. Carried out radiation safety surveys after installation of 4000 Curie Co-60, 4-MV CLINAC-4 and new 6000 Curie Theratron 780 machines, having participated in shielding design. Lectured to Radiology residents and technologists on the physical principles of radiology, radiation therapy and nuclear medicine. In 1973-74 prepared AEC renewal application for cobalt facility and human uses (nuclear medicine) of Byproduct Material licenses; approvals were obtained from AEC and State. Programmed radioimmunoassay calculations and statistical quality control factors in Fortran for CDC-3300 computer. Set up computer methods of treatment planning, tumor registry and radioimmunoassay on Artronix PC-12. Certified in Therapeutic Radiological Physics in 1975, after submitting reports on some of the above calibrations and surveys, and passing oral examinations of American Board of Radiology.

*Adjunct Research Professor, School of Pharmacy,
Duquesne Duquesne University, Pittsburgh, PA 15219 (Joint part-time appointment with above position, 1971-75).*

Taught required course in research methods, Biostatistics and Epidemiology, to Pharm. D. students in pharmacy; taught course in Radiological Health to undergraduate and graduate students; participated in organization of B.S. program in radiological sciences; advised doctoral students on drug research design and data evaluation.

*Adjunct Associate Professor of Health Physics, Department of
Radiation Health, GSPH, University of Pittsburgh, Pittsburgh,
PA 15213 (Joint part-time appointment).*

Continued supervision of about 1-2 graduate students per year; continued on project involving chelation therapy and internal dosimetry of Am-241 and as consultant and coinvestigator of AEC Health and Mortality Study under Dr. Thomas Mancuso of the Department of Occupational Health until 1973.

Clinical Assistant, Radiation Medicine Unit, Department of Radiology, Presbyterian-University Hospital, Pittsburgh, PA 15213.

Continued on call for emergency team as a reserve consultant in the event of radiation emergencies requiring evaluation of internal radiation exposure.

6/66-3/71 - *Associate Professor of Health Physics, Department of Occupational Health (later in the Department of Radiation Health). Graduate School of Public Health, University of Pittsburgh (5/69 - Department of Radiation health, formerly a section in Department of Occupational Health under Dr. Niel Wald, became a Department).*

Taught radiation and health physics courses. Advised graduate students. Co-investigator of AEC Health and Mortality Study under Dr. T. F. Mancuso, Department of Occupational Health (1964-73). As Technical Director, Radiation Medicine Department, Presbyterian-University Hospital, designed and operated whole-body counter and bioassay laboratory facility (1964-70), carried out measurements and research on measurement of internal radionuclides in humans for both medical and occupational health purposes, with assistance of research grants from Health Research and Services Foundation, and Bureau of Radiological Health. Participated with Dr. Niel Wald in investigation and evaluation of accident cases of inhalation exposures and high-level external exposures. During participation in Radiation Health Training program at Graduate School of Public Health (1961-71), graduated 17 M.S. and 1 doctoral student as major advisor, served on about 60 other graduate student committees. Coordinated radiation and health physics part of teaching program (1970-71). Also, set up AEC Fellowship Program at University of Pittsburgh and served as AEC Fellowship advisor (1967- 70). Served also as consultant to Oak Ridge Associated Universities and as a member of AEC Fellowship Board on Radiation Science and Protection. As Radiation Safety Officer, provided advice and supervision to the University Radiation Safety Office professional staff, for a University and medical center complex.

6/66-6/70 - *Technical Director, Radiation Medicine Unit, Radiology Department, Presbyterian-University Hospital, Pittsburgh, Pennsylvania. (Joint appointment).*

Designed, developed (as indicated above), and operated bioassay and in vivo radioactivity counting facility, participated in evaluating human exposures to plutonium, americium and various fission products. Also performed uptake and rate studies for Nuclear Medicine Department. (This was a continuation of some of the responsibilities of the previous position, and was a Joint position with that described below).

8/61-6/66 - *Research Associate in Radiation Health, Department of Occupational Health,*

Graduate School of Public Health, University of Pittsburgh.

Participated (as co-investigator with N. Wald, M.D., and A. A. Spritzer, M.D.) in a project designed to evaluate methods of estimating radiation exposures to occupational populations and to develop methodology of obtaining the best estimates of radiation exposure to various body organs using health physics data from personnel and area monitoring procedures. Pilot radioepidemiological studies were attempted to correlate radiation exposures with the presence or absence of appropriate biomedical effects. Helped design, negotiate construction specifications and set up the University of Pittsburgh whole-body counting facility at Presbyterian-University Hospital, and served as Technical Director until June 1970. Carried out clinical studies on retention of various radiopharmaceuticals. Evaluated a number of accidental cases of inhalation of radioactive materials, including Pu, Am, Ir-192, I-131, I-125, H-3, fission products, U, Th. Performed studies on film sensitivity and precision in film dosimetry (see publications). In 1965, completed PHS project and transferred to AEC study of the feasibility of conducting epidemiologic investigations of persons occupationally exposed to radiation in AEC facilities. Supervised dose reconstruction for workers, and participated in establishing methods of statistical analysis. Helped prepare research proposal for five-year study, approved by AEC in 1965. Also, participated in health physics teaching program and advised several M.Sc. Students. Was promoted to tenure Associate Professorship after receiving the Sc.D.degree, as noted in the above-described position.

3/59-8/61 - Radiation Hazards Physicist, Division of Licensing and Regulation, U.S. Atomic Energy Commission (AEC), Washington, D.C.

Reviewed radiation safety and plant design aspects of license applications for various uses of radioactive material, particularly those involving special problems or higher levels of radioactivity. Participated in prelicensing visits and discussed licensing requirements with industry management for some of the earliest licensed fuel fabrication and fuel element research facilities. Prepared radiation safety and environmental risk evaluations published in the Federal Register concerning the specific exemption of proposed environmental research applications and commercial products containing small amounts of radioactive material (including tritium in watchdials and in aircraft markers), and recommended approval or disapproval, as appropriate. Evaluated public comments, prepared drafts (together with Branch and Division directors) and obtained concurrences on the 1961 revision to the basic Federal regulation on radiation protection, "10 CFR Part 20, Standards for Protection Against Radiation," and other regulatory amendments related to exemption of certain products or quantities of particular radionuclides. Chaired working group and prepared draft performance criteria for personnel dosimetry, later published by AEC in 1963. Helped develop fundamental criteria for the evaluation of license applications and exempt products based on the radiotoxicity of individual

nuclides and physical, chemical, biological, environmental and plant design considerations.

9/57-3/59 - Health Physicist, Division of Biology and Medicine, U.S. AEC, Washington, D.C.

Reviewed variety of radiation safety programs, emergency plans and nuclear reactor hazard evaluation reports. Helped develop "Manual Chapters" on standards and policies for radiation protection in AEC nuclear reactor and chemical processing installations. Represented AEC in negotiations with Department of Defense and helped establish joint radiological emergency plans and joint AEC-DOD center to deal with nuclear weapons and other radioactivity incidents. Wrote sections, incorporated 50-page appendix of data and rules of thumb, and edited talks for the emergency handbook, TID-8206, Information for Controlling Radiation Emergencies, included in AEC emergency instrument kits. Used kit to respond one night to a leaking nuclear fuel cask from Canada in a Baltimore freightyard. Reviewed and advised on evaluation of internal and external radiation exposures for incidents involving various radionuclides.

6/56-9/57 - Physicist, Radiological Defense Officer, Federal Civil Defense Administration, Region 2, Olney, MD.

Helped State and local governments train and organize for emergency planning and radiation protection in civil defense. Presented lectures and demonstrations to governors' committees, State and local civil defense groups, and various lay and professional organizations. Participated in seminars on the continuity of Federal government functions under emergency conditions. Co-director of course at Nevada Test Site at Operation Plumbbob in 1957, where I trained policemen, firemen and other responders from throughout the nation to monitor radiation and properly respond to emergencies in fallout fields from nuclear weapons.

8/55-6/57 - President, Health Physics Services, Inc., Baltimore, MD.

Set up and managed with partners, a consulting and commercial film badge service for x-ray, gamma, beta and neutron monitoring. The film badge business was growing, but I sold the company to one of my partners in 1957 to accept a position with the Atomic Energy Commission.

6/55-9/55 (summer) - Nuclear Physicist, Nucleonics Division, Naval Research Laboratory, Washington, D.C.

Set up vibrating reed electrometer and standard air ionization chambers, and calibrated primary standard 50-300 KVCP x-ray field range in Roentgen

exposure units, using standard air chamber similar to that of National Bureau of Standards.

9/54-6/56 - Graduate Student and Instructor (Jr.), Physics Department, The Johns Hopkins University, Baltimore, MD.

4/53-8/54 - Physicist, Operation Castle, as 1st Lt., AUS, on duty at Naval Research Laboratory and Pacific Proving Grounds, JTF 7, TG 7.1.

Developed and carried out methods of neutron flux and dose measurement vs. distance from hydrogen bomb detonations by using fission threshold detectors and nuclear photographic emulsions. Developed algorithms for interpreting track data and better methods of electrodepositing uranium, thorium, neptunium and plutonium onto platinum. Participated in field placement and recovery of detectors at PPG. Co-authored final WT report, and later published methods of fission track analysis and rapid and efficient electrodeposition of fissionable elements(see publication list)..

3/52-4/53 - Physicist, Operation Ivy, as 2nd Lt. AUS, on duty at Naval Research Laboratory and Eniwetok Proving Grounds, JTF 123, TG 7.1.

Participated at U. S. Naval Research Laboratory in developing detectors for measurement of radiation signals for use in diagnostics of H-bomb tests at Eniwetok during Operation IVY. Participated in development and directed calibration of basic scintillation detectors used in physics analyses. Developed mathematical method of using generating functions to calculate statistical uncertainties of detector signals in nanosecond intervals, which was used to alert theoretical physicists to signals that had decayed into the noise level of detectors. Participated in field installation of facilities and performed field calibration at Eniwetok of basic detectors using high intensity gamma source. One of co-authors and scientific editors of series of final project reports.

10/50-3/52 - Head, Health Physics Unit, Naval Research Laboratory, Washington, D.C.

Established and supervised a radiation safety program for a research laboratory of several thousand personnel.

Set up procedures for personnel and area monitoring, developed methods for measuring neutron, gamma and x-ray exposures from particle accelerators, x-ray devices and radioisotopes. Derived differential equation relating fast neutron spectra to recoil proton spectra. Wrote first progress report summarizing procedures and methods of the Health Physics Unit, before being called to active duty in the Army for assignment as a physicist to Operation Ivy.

CONSULTING AND OTHER ACTIVITIES

Consultant to companies in health physics and radiation hazard evaluation; Consulting Radiological Physicist, Mercy Hospital, Pittsburgh, PA. 1966-69; Consultant, Duquesne University Radiation Safety Office (1970-75); Member, University of Michigan Committee on Personnel Dosimetry Accreditation, 1966-68; Consultant and Member of AEC Fellowship Board on Radiation Science and Protection, Oak Ridge Association Universities, 1968-71; Consultant to law firms; Chairman, ANSI subcommittee on film badge dosimetry standard, and ANSI subcommittee to develop criteria for laboratories handling radioactive materials, Health Physics Society, 1968-72; Consultant, National Academy of Sciences, Subcommittee on Relocation Planning for Nuclear Emergencies, 1975; Member, Health Physics Society subcommittees to develop ANSI standards for bioassay of tritium, plutonium, uranium, fission/activation products, and bioassay performance and accreditation criteria; American Association of Physicists in Medicine committee on biological effects of radiation, chair of subcommittee on radiation emergencies, radiation safety committee, legislation and regulations committee; NRC representative to ANSI N44 committee. Expert defense witness for Department of Justice on radiation litigation, 1983-84, and for claimants in two cases of acute radiation injury; President, Western Pennsylvania Region, American Professors for Peace in the Middle East, 1970-71. Member of several review groups on health effects research contracts for government agencies.

MEMBERSHIPS HELD AND ACTIVITIES IN PROFESSIONAL AND SCIENTIFIC SOCIETIES

American Academy of Health Physics

Nominating Committee, 1987-90.

American Association of Physicists in Medicine

Member Chairman, Penn-Ohio Chapter; member, Radiation Protection Committee, 1975-76; Member, Legislation and Regulations Committee, 1976-77; Member, Biological Effects Committee, 1986-1992, and Chairman, TG3, Radiation Emergencies Task Group, 1986-1992; Member, Low-Level Effects Task Group, 1986-1992; Liaison to Legislation and Regulation Committee from Mid-Atlantic chapter, 1989-90.

American Conference of Governmental Industrial Hygienists (inactive) (formerly on Committee on Legislation)

American Industrial Hygiene Association

Pittsburgh Chapter (Nominating committees, 1960s)

American Nuclear Society

American Physical Society (inactive)

American Public Health Association

American Statistical Association (inactive)

Baltimore-Washington Chapter of the Health Physics Society

Founder, first Chairman, Nominations and Elections; first Program Chairman; Secretary-Treasurer, 1961; President-Elect, 1981-82; President, 1982-83; Nominations and Elections, 1986-89.

Health Physics Society

Program Committee, 1956-57; Chairman, Standards Committee, 1959-61, Member 1958-71; elected, Board of Directors, 1967-70; Chairman, Standards Committee (developed policy for standards writing and established first ANSI working groups, chairing two until 1971), 1967-70; Alternate Representative to Nuclear Standards Board, USA Standards Institute, 1967-71; Director of 1983 Summer School on Internal Dosimetry; Nominations Committee, American Academy of Health Physics, 1985-86; Committee to revise Part I of ABHP Certification Examination, 1986-87; Ad Hoc Committee on Risk Assessment, 1988-1994; Member, Standards Committee Working Groups developing national standards for tritium bioassay, fission product/activation product bioassay, plutonium bioassay, bioassay performance criteria, radiation protection requirements for facilities using unsealed radioactive materials, and Chairman, uranium bioassay Working Group that published N13.22-1995; Co-founder and Secretary, Government Section, 1989-92, Program, Rules and Elections Chair, 1999-2001, Board member, 2003-2005; Member, ANSI 13.62 working group on training; Delegate to 10th International Congress of the International Radiation Protection Association, Hiroshima, Japan, May 2000. Member, reconstituted working group for ANSI N13.30, Performance Criteria for Radiobioassay (2001 -). Member, Public Education Committee (2001 -2002). Chair, Ad Hoc Committee on Homeland Security, 2001-2003. Organized AAHP courses on homeland security at 2003 HPS midyear and annual meetings. Academic Dean of 2004 Summer School of HPS on "Protecting the Public from Nuclear, Biological and Chemical Terrorism," and editor and contributor to course text. Co-director of AAHP course on dose assessment methods following radiological attack planned for February 12, 2005 at New Orleans Midyear meeting of the Health Physics Society.

New York Academy of Sciences (inactive)

Sigma Xi

Society for Risk Analysis

Society of Nuclear Medicine (inactive)

Western Pennsylvania Chapter of the Health Physics Society (Chairman, Rules Committee and Nominations Committee - prepared Constitution and By-Laws and helped obtain Charter from parent Society; Chairman, Education

Committee; President-Elect, 1966-67; President, 1967-68; Chairman, Awards and Rules Committees, 1972-73).

HONORS, AWARDS, CITATIONS, GRANTS

Who's Who in the World (1998-)

Who's Who in America (2005)

Who's Who in the East (1992)

Who's Who in Science and Engineering, 2nd Ed.

World Who's Who in Science

American Men and Women of Science

Leaders in American Science

Dictionary of International Biography (1971 ed.)

American Board of Medical Specialties, Directory of Board Certified Medical Specialists (Therapy Physics)

AEC-NRC Radiological Physics Fellowship, 1949-50

Letter of Commendation for work on Project Ivy, Joint Task Force 132

Letter of Commendation for establishment of Health Physics Unit at the Naval Research Laboratory

Certified, American Board of Health Physics, 1960; recertified 1982, 1985, 1996, 2000, 2004

Certified, Radiological Aspects, American board of Industrial Hygiene, 1966; recertified 1986, 1990, 1996, 2002

Certified, Therapeutic Radiological Physics, American Board of Radiology, 1975

Election to Board of Directors, Health Physics Society, 1967-70; Election to

President, Western Pennsylvania Chapter, Health Physics Society, 1967-70;

Election to President, Baltimore-Washington Chapter, Health Physics Society, 1981
Sigma Xi

4-year State Scholarship in Engineering, the Johns Hopkins University, awarded at end of 11th grade of high school (Baltimore Polytechnic Institute (Poly))

AEC and NRC "Q" Clearance, 1949-82; 1988- renewed for ORAU/DOE. DOD Clearance, 1952-54, 1998 -

Principal Investigator, PHS Grant No. RH 00545-02, Bureau of Radiological Health, Department of Health, Education and Welfare, 1968-70; and renewal 1970-71, transferred to Dr. Wald in 1971 when I left the University. Several other grants as investigator or co-investigator.

Nuclear Regulatory Commission representative at the Congressional Seminar on Low-level Radiation, Dirksen Senate Office Building, Washington, DC, February 10, 1978 (proceedings published by Congress)

Wright H. Langham Lecturer on "Radiation Epidemiology," University of Kentucky, 1979

Distinguished Service Award, 1974, for outstanding contributions to the science and profession of radiation protection, from the Western Pennsylvania Chapter, Health Physics Society

Paper, "Determining Industrial Hygiene Requirements for Installations Using

Radioactive Materials,” *Am. Industrial Hygiene Journal*, 1965, was selected as one of the historic papers for re-publication in the 25th Anniversary issue of the journal *Health Physics*, June 1980

Founders Award, *Health Physics Society*, for contributions to the health physics profession, July 1986

1986 Failla Memorial Lecturer, *Greater New York Chapter of the Health Physics Society and Radiological and Medical Physics Society* (January 21, 1987)

Certificate of Appreciation from *Bioassay, Analytical and Environmental Radiochemistry Conference* for “inspirational leadership and scientific contributions” (October 21, 1986)

Paper, “Statistical Considerations in Practical Contamination Monitoring,” *Radiation Protection Management*, Vol. 8, No. 4, 1991 presented Editor’s Award for Excellence, 1992

Fellow Member Award, *Health Physics Society*, 1992

Radiation Science and Technology Award, *American Nuclear Society*, 1993

Invited and presented two-hour video taped lecture at 1996 meeting of *Health Physics Society* for incorporation into Society’s history and training library; subject was on determining radiation protection requirements vs. quantities and types of radioactivity material processed.

Life Member Award, *Western Pennsylvania Chapter, Health Physics Society*, 1997

Interview on career videotaped by *History Committee, Health Physics Society* for library in February 2000, and at 50th anniversary meeting of the *HPS.*

Certificate of Appreciation, *Health Physics Society*, for chairing working group that completed *ANSI N13.22-1995, Bioassay Programs for Uranium*, awarded at 2000 *Health Physics Society* meeting. Other certificates awarded for participation in *Tritium and Performance Criteria for Radiobioassay* working groups.

Robley D. Evans Medal, Health Physics Society, for scientific and educational contributions to radiation protection, June 2001.

Invited banquet speaker on *The Great Advances in Radiation Dosimetry, 13th Solid State Dosimetry Conference, Athens, Greece, July 12, 2001.*

Distinguished Graduate Award, Graduate School of Public Health, University of Pittsburgh, April 2004, for contributions to public health.

Health Physics Society Award for Outstanding Volunteer Service to the Baltimore-Washington Chapter, September 2004.

BOOKS, BOOK-LENGTH REPORTS AND CHAPTERS

1. *NRL reports on Operation Ivy (classified literature), one of many contributors and several editors.*
2. *A Compendium of Information for Use in CONTROLLING RADIATION EMERGENCIAS, compiled and edited by Allen Brodsky and G. Victor Beard, TID-8206 (rev) (USAEC), September 1960 (Government Document, available NTIS, U.S. Dept. of Commerce, Springfield, VA. 22161), 100 pp.*
3. *A Stochastic Model for Tumor Induction as Applied to Skin Tumors in Mice, by Allen Brodsky, doctoral dissertation, Graduate School of Public Health, University of Pittsburgh (University Microfilms, Inc. 1966), 136 pp; abstract in Dissertation Abstracts V2710 p. 3413B, 1967.*
4. *“Radiation Protection and Regulation,” by Allen Brodsky and Francis J. Bradley, Part VIII, pp. 573-831, in Handbook of Radioactive Nuclides. Edited by Yen Wang, M.D., D.Sc. Chemical Rubber Co., Cleveland, OH 1969, 960 pp. The following chapters of Part VIII were authorized by Allen Brodsky:*
 - “Basic Units of Radiation Measurement,” pp. 573-608.
 - “Radiation Protection Guides and Regulatory Limits of Exposure,” pp.609-646.
 - “Data and Methods for Estimating Radiation Exposures from Internal and External Radiation Sources,” pp. 647-663.
 - “Determination of Facilities, Equipment, and Procedures Required for Various Types of Operations,” pp. 664-710.
 - “Personnel Dosimetry,” pp. 711-719.
5. *Determining Industrial Hygiene Requirements in Installations Using Radioactive Materials,” by Allen Brodsky, in Norman V. Steere, Editor, Handbook of Laboratory Safety, Chemical Rubber Co., Cleveland, OH, 1970, pp. 482-502.*
6. *“Basic Units of Radiation Measurement,” ibid., pp. 391-426.*
7. *Chapter in 5. Above reprinted in Handbook of Materials Science, Volume III, CRC Press, Cleveland, OH, 1975.*
8. *“Radiation Dose and Risk Determination,” in Handbook of Materials Science, ibid., pp. 213-284.*

9. Handbook of Radiation Measurement and Protection: Section A. Volume I: Physical Science and Engineering Data, Allen Brodsky, Editor, Editor-in-Chief of series, CRC Press, Inc., 1979.

Chapters by Allen Brodsky:

3.1 *Fundamental Constants*

3.1 *Charts of Nuclides and Elements*

3.5 *X and Gamma Ray Absorption and Scattering Coefficients*

3.7 *Selected Particle and Photon Spectral Data*

Appendix A.3.8, *Supplementary Information for Estimating Internal and External Exposure Hazards*

10. Handbook of Radiation Measurement and Protection: Section A. Volume II: Mathematical and Biological Information, Allen Brodsky, Editor, Editor-in-Chief, April 1982.

Chapters by Allen Brodsky:

5.5 *Biological Data Used in Dose Calculations (Gorman S. Hill and Allen Brodsky)*, pp. 121-234.

6.1 *Mathematical Equations Used in Radioactive Decay Problems*

6.2 *Statistical Methods of Data Analysis*

6.4 *Models for Calculating Doses from Radioactive Materials Released to the Environment*, pp. 367-422.

6.5 *Mathematical and Statistical Tables*

Appendix A.6.4.2, *Dose and Risk Information on Three Mile Island*

11. As Editor-in-Chief of the CRC Handbook Series in Radiation Measurement and Protection, Dr. Brodsky also initiated the following two volumes, enlisted most of the authors, edited and contributed to some of the early chapters before turning completion over to the editors:

Alfred W. Klement, Editor, "CRC Handbook of Environmental Radiation," CRC Press, Inc., 1982.

Kenneth L. Miller and William A. Weidner, Editors, "CRC Handbook of Management of Radiation Protection Programs," CRC Press, Inc., 1986.

12. Allen Brodsky, "Protecting the Public," in Nuclear Power: Both Sides, edited by Michio Kaku and Jennifer Trainer, W. W. Norton and Co., N.Y., 1982, pp. 46-56.

13. Allen Brodsky, "Update on Preparations for Managing Radiation Accidents," in Coping with Radiation Accidents (Hospital and Community Planning), edited by Michael A. Vince, Envirotex Management, Inc., 149 N. Prospect St., Ravenna, OH 44266, 1990.

14. Two chapters in Kenneth L. Miller, Editor, "CRC Handbook of Management of Radiation

Protection Programs,” 2nd Edition, CRC Press, Inc., 1992:

Allen Brodsky, “Properly Relating Radiation Protection Requirements to Relative Radiotoxicity and Risk.”

Allen Brodsky, Phyllis L. Brodsky, and Kenneth Mossman, “Education and Training in Radiation Protection.”

15. *Allen Brodsky, “Review of Radiation Risks and Uranium Toxicity, with Application to Decisions Associated with Decommissioning Clean-Up Criteria,” RSA Publications, Hebron, CT, 1996.*
16. *D. A. Schauer, A. Brodsky, and J.A. Sayeg, “Radiation Dosimetry,” Chapter 15 in M. F. L’Annunziata, Editor, Handbook of Radioactivity, Second Edition, Academic Press, New York, 2003.*
17. *Allen Brodsky, Raymond H. Johnson, Jr., and Ronald E. Goans, Editors, Public Protection from Nuclear, Chemical, and Biological Terrorism, Medical Physics Publishing, 2004 (textbook for the Health Physics Society 2004 Summer School of July 6-9, 2004; see #179 under the following publications list for the chapters and appendices of information contributed to this book by Allen Brodsky).*

PUBLISHED ARTICLES AND SELECTED REPORTS, PAPERS, TALKS

1. *“Monitoring Radiation Hazards at NRL,” by Allen Brodsky, NRL Reprint No. 13- 52, March 1952. (Published in NRL Progress Report, Naval Research Laboratory, Washington, DC).*
2. *“Determining Neutron Fluxes from a Pulsating Radiator,” by Allen Brodsky, Nucleonics 10, No. 12, 36-39 (1952).*
3. *“Neutron Flux Measurements,” by T. D. Hanscome, D. K. Willett, and Allen Brodsky, issued October 1955 as WT-914 (SRD)(declassified version available).*
4. *“Counting Pulsed Neutron Fluxes in the Presence of Pulsed X Rays,” by Allen Brodsky and William J. Willis, NRL Report 4643, November 1955.*
5. *“Techniques for Using Fissionable Deposits in Neutron Measurements,” by Allen Brodsky, . L.W. Fagg, and T. D. Hanscome, NRL Report 4746 (1956).*
6. *“A Standardized X-Ray Field Range,” by H. M. Childers, Allen Brodsky, and A.E. Nash, NRL Report 5122, April 1958.*
7. *“A Short Procedure for Electrodepositing Fissionable Elements,” by Allen Brodsky, L. W. Fagg, and T. D. Hanscome, HEALTH PHYSICS, 1, 189-91, September 1958.*
8. *“The End-Effect Correction for Measuring Neutrons with Stilbene Scintillators,” by Allen*

Brodsky and G. E. Owen (abstract), HEALTH PHYSICS, 4, No. 2, p.193, 1960.

9. "The Pulse Distributions in Stilbene by 1-15 MeV Neutrons, Corrected for End Effect," by Allen Brodsky, TID-13075 (USAEC Report, available from CFSTI), submitted June 1961 (issued December 1961), 68 pp.

10. "Comparison of Multiple-Film and Single-Quarterly-Film Measurements of Gamma Dose at Several Constant Conditions of Temperature and Humidity," by Allen Brodsky and Ronald L. Kathren, presented at the Health Physics Society Meeting, Chicago, June 1962, abstracted in HEALTH PHYSICS, 8, p. 473, August 1962.

11. "More on Radiation Regulations," NUCLEONICS 20, 6-7, July 1962, letter to the editor, by Allen Brodsky

12. "A Cytogenetic Study of Some Radium Dial-Painters and Their Progeny," by Niel Wald, M.D., Charles Miller, Ph.D., Wayne H. Borges, M.D., Kip Kim, M.D., and Allen Brodsky, M.A., presented at the 2nd International Congress of Radiation Research, Harrogate, Yorkshire, England, August 1962, published as SAM-TDR-63-1, April 1963, available from ASTIA.

13. "Accuracy and Sensitivity of Film Measurements of Gamma Radiation - Part I, Comparison of Multiple Film and Single Quarterly-Film Measurements of Gamma Dose at Several Environmental Conditions," by Allen Brodsky, Ronald L. Kathren, HEALTH PHYSICS, 9, 453-462, No. 5, May 1963.

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126. A. Brodsky and H. Cember, "Adapting Guidelines for Radiation Protection for Designing Facilities Processing Other Toxic Materials," presented at the annual meeting, American Industrial Hygiene Association, Orlando, FL, May 17, 1990.

127. A. Brodsky, "1990 Distinguished Scientific Achievement Award, presented to Herman Cember," *Health Phys.* 59(3), 255-256, 1990.

128. A. Brodsky, "Determining Staffing Requirements for Medical-Academic Radiation Protection Programs," *Radiation Protection Management*, Vol. 8, No. 1, pp. 46- 57, Jan/Feb 1991.

129. A. Brodsky, "Below Regulatory Concern - Or Simply Exempt?" invited editorial, *Nuclear Engineering International*, May 1991, p. 23.

130. A. Brodsky and R. G. Gallagher, "Statistical Considerations in Practical Contamination Monitoring," *Radiation Protection Management*, Vol. 8:64-78, 1991. (Selected as best paper award by the journal, 1991).

131. A. Brodsky, "Robert Golden, 1921-1990, In Memoriam," *Health Phys.* 61(3), 437, 1991.

132. A. Brodsky, "Update on Statistical Criteria for Radiobioassay Performance Standard," invited talk of 37th Bioassay, Environmental and Analytical Radiochemistry conference, Ottawa, Canada, Oct. 7, 1991 (unpublished).

133. A. Brodsky, "Risk Assessment, Uncertainties and Errors," invited talk presented at 37th Bioassay, Environmental and Analytical Radiochemistry Conference, *ibid.*

134. A. Brodsky, "Exact Calculation of Probabilities of False Positives and False Negatives for Low Background Counting," *Health Physics*, 63(2): 198-204, 1992.

135. A. Brodsky, "1992 Distinguished Scientific Achievement Award, Presented to Bernard L. Cohen," *Health Physics*, 63(3): 487-488, Nov. 1992.

136. A. Brodsky, "1992 Distinguished Scientific Achievement Award, Presented to James E. Turner," *Health Physics*, 63(3): Nov. 1992.

137. A. Brodsky, "Standardizing Minimum Detectable Amount Formulations," letter, *Health Physics*, 64(4): 434-435, 1993.

138. A. Brodsky, "Detection Limit Quandary and Missed Dose Concept," invited talk presented at the Workshop on the Epidemiologic Use of Nondetectable Values in Radiation Exposure Measurements, chaired by Richard W. Hornung and Henry Spitz, National Institute of Occupational Safety and Health, Robert A. Taft Laboratories, Cincinnati, OH, Sept. 9, 1993 (proceedings published in summary form in 1995).
139. A. Brodsky, "Are Radiation Risks Real Below 0.001 Sv per Year?" invited paper, invitation being part of 1993 Radiation Science and Technology Award, presented at American Nuclear Society Winter Meeting, San Francisco, CA, Nov. 17, 1993. Abstract in ANS Transactions, Vol. 69, p. 177, 1993.
140. A. Brodsky, "1994 Distinguished Scientific Achievement Award, Presented to Otto G. Raabe," Health Physics, 67, 439-440, 1994.
141. A. Brodsky, "Evaluation of Health Effects Associated with Decommissioning Clean-up Criteria," Final Report on Contract No. DAAL01-93-P-0883 to U. S. Army Research Laboratory, 2800 Powder Mill Road, Adelphi, MD 20783-1145, Sept. 14, 1994, 326 pp.
142. A. Brodsky, "Are Radiation Risks Real Below 0.001 Sv per Year?" Radiation Protection Management Vol. 12, No. 3, pp. 61-79, May/June 1995.
143. A. Brodsky, R. L. Kathren and C. A. Willis, "History of the Medical Uses of Radiation: Regulatory and Voluntary Standards of Protection," invited paper for Centennial issue of Roentgen's discovery, Health Physics, Vol. 69, No. 5, 783- 823, Nov. 1995.
144. A. Brodsky, Chair, Working Group N13.22, "Bioassay Programs for Uranium," approved by N13 Committee in 1995, published in May 1996 as ANSI standard, in Health Physics Society Newsletter.
145. A. Brodsky, "Radiation Risks and Uranium Toxicity," RSA Publications, Hebron, CT, 1996.
146. A. Brodsky, "Assessing Tritium Decontamination Requirements in a Watch Dial Plant," in K. Mossman, Editor, NORM/NARM: Regulation and Risk Assessment, Proceedings of the 29th Midyear Topical Meeting, 7-10 January 1996, Scottsdale, Arizona, Health Physics Society, 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101, 1996.
147. A. Brodsky, Book review of "My Life with Radiation," by Ralph E. Lapp, Health Phys. 1996.
148. A. Brodsky, "Dose-Response Shapes: Linear Excess Relative Risk or Lognormal Absolute Risk", abstract in Health Physics, Vol. 74, No. 6 (Supplement), pp. S50-S51, June 1998; talk presented at the annual meeting of the Health Physics Society, Minneapolis, July 15, 1998.

149. A. Brodsky and J. S. Dancz, “Lognormal and Linear Shapes of Human Cancer Mortality vs. Radiation Dose,” submitted for journal publication, March 31, 1998. To be revised.
150. Organized 8-hour continuing education course for American Academy of Health Physics, Minneapolis, July 11, 1998, and presented two one-hour lectures on:
- a) Application of Uranium Toxicity and Metabolic Data to Determining Limits on Intake and Concentration,
 - b) Development and Application of Standards for Protecting Workers and the Public
151. A. Brodsky, Book Review, “Chaos and the Changing Nature of Science and Medicine: An Introduction,” Edited by Donald E. Herbert, Paul Croft, Daniel S. Silver, Susan G. Williams, and Marie Woodall. American Institute of Physics, Woodbury, NY, 1996, published in *Health Physics*, Vol. 75(3), 330-332, 1998.
151. A. Brodsky, D. M. Schaeffer, S. O’Toole, E. Kaplan, N. Barss, J. Dancz, W. J. Klemm, D.A. Raine III, and J. Stiver, “Statistical Model for Fission Track Analysis of Plutonium in Human Samples,” (abstract) *Health Phys.*, Vol. 76 (6), S175, 1999
152. A. Brodsky and N. M. Barss, “Mathematically Analytic Distributions to Fit Radioanalytic Results,” poster presentation at the 45th Conference on Bioassay, Analytical and Environmental Radiochemistry, National Institute of Standards and Technology, Gaithersburg, MD, October 18-22, 1999.
153. A. Brodsky, “Cumulative Lognormal Distributions of Dose-Response vs. Dose Distributions,” in the proceedings of the 10th International Congress of the International Radiation Protection Association, Hiroshima, Japan (published as CD by IRPA-10 Secretariat, Radiation Control Division 1, Dept. of Health Physics, Tokai Research Establishment, JAERI, Tokai, Naka-gun, Ibaraki 319-11, JAPAN, May 14-19, 2000.
154. A. Brodsky, “The Challenge: Harmonizing Government and Industry Roles and Rules for Radiation Safety,” presented at the plenary session of the Government Section at the 45th Annual Meeting of the Health Physics Society (American Radiation Safety Conference and Exposition), Denver, Colorado, June 28, 2000.
155. A. Brodsky, “Civilian Protection Measures Against Terrorist Attack Are the Best Preventive Medicine,” letter, *Am. J. Public Health*, Vol. 90, No. 8, 1325, August 2000.
156. A. Brodsky, “Mathematically Analytic Distributions Can Explain Radioanalytic Results,” presented at the 46th Annual Conference on Bioassay, Analytical and Radiochemistry,” Seattle, Washington, November 12-17, 2000.
157. A. Brodsky, “Bayesian Formulations are Not Appropriate for A Priori Specification of Analytical Detection Capabilities,” *Health Phys.* 80(6), 620-621 (letter); 2001.
158. A. Brodsky, D. A. Raine III, M. Moshaashae, “ ‘Acceptable Emergency Doses’ from Submersion in Fission Product Clouds,” presented at the 2001 annual meeting of the Health Physics Society. *Health*

Phys. 80(6), Supp.:S149 (abstract); 2001.

159. W. J. Klemm, A. Brodsky, D. M. Schaeffer, "Radioanalytic data interpretation when the ratio reading/median is lognormally distributed," presented at the 2001 annual meeting of the Health Physics Society. *Health Phys. 80(6), Supp.: S105; 2001.*

160. N. M. Barss, A. Brodsky, E. Jackson, "Estimating Population Doses from Plutonium from Fission Track Analysis and Autopsy Data," presented at the 2001 annual meeting of the Health Physics Society. *Health Phys. 80(6), Supp.:S105-106; 2001. (To be submitted for publication.)*

161. A. Brodsky, "Origins of Radiation Dosimetry," invited talk at annual meeting of the Baltimore-Washington Chapter of the Health Physics Society, May 2001.

162. A. Brodsky, "Detection Levels and Minimum Detectable Amounts – Some Background," invited paper for MDA Workshop, presented at the 47th Annual Radiochemical Measurements Conference, Honolulu, Hawaii, November 3-8, 2001.

163. A. Brodsky, D. G. Martinez, W. Jeffrey Klemm, "Uncertainty Analysis of Analytical Results When Errors are Not Normally Distributed," presented at the 47th Annual Radiochemical Measurements Conference, Honolulu, Hawaii, November 3-8, 2001.

164. A. Brodsky, D. A. Raine III, M. Moshaashae, "Estimating 'Acceptable Emergency Doses' from Submersion in Fission Product Clouds," *Radiation Protection Management Vol.18, 17-33, September/October 2001.*

165. A. Brodsky, "Radioactivity Hazards in Survival Planning," *Radiation Protection Management Vol. 18, 34-46, September/October 2001.*

166. A. Brodsky, "The Great Advances in Radiation Dosimetry," invited banquet talk, 13th Solid State Dosimetry Conference, Athens, Greece, July 12, 2001 (in *Radiation Protection Dosimetry Vol. 101, Nos.1-4, 601-606, 2002.*)

167. W. Potter and A. Brodsky "Uncertainty Analysis for Detection Limit Definition and Confidence Interval Estimation," presented at the 47th Annual Meeting of the Health Physics Society, Tampa, FL, June 17, 2002

168. A. Brodsky, L. J. Deal, P. S. Harris, M. Stangler, and M. Barbier, "Lessons for Responders from Nuclear Weapons Tests and Radiation Accidents," presented at the 47th Annual Meeting of the Health Physics Society, Tampa, FL, June 19, 2002.

169. A. Brodsky and D. G. Martinez, "Uncertainty Analysis of Analytical Results When Errors are Not Normally Distributed," unpublished 2002, to be revised and submitted later as sequel to #178..

170. A. Brodsky, "Health Physics Experiences Teach Us How to Prepare for Radiological Attacks," presented at the annual meeting and symposium of the Baltimore-Washington Chapter of the Health Physics Society, at the National Institute of Standards and Technology, Gaithersburg, Maryland, May 20, 2002.

171. M. Stangler, A. Brodsky, J. Barnes, and B. Buddemeier, "Principles and Course Materials for Training Responders," presentation in Course 1, Materials and Methods for Training Responders to

Radiation Emergencies, sponsored by the American Academy of Health Physics, January 25, 2003, San Antonio, Texas.

172. H. Cember and A. Brodsky, “Experiences in Communicating to the Public,” presentation in Course 2, *Materials and Methods for Informing the Public of Simple Protective Actions in Radiation Emergencies, sponsored by the American Academy of Health Physics, January 25, 2003, San Antonio, Texas.*

173. G. Anastas, A. Brodsky, and M. Stangler, “Scientific Advantages and Absurdities of SI Units in Radiation Protection,” presented at the 48th Annual Meeting of the Health Physics Society, San Diego, July 22, 2003 (abstract in *Health Physics Vol.84, No.8(Supplement)*, p. S241, June 2003).

174. A. Brodsky, “Easy Calculation of Radiation Dose Above Contaminated Planar Sources,” presented at the 48th Annual Meeting of the Health Physics Society, San Diego, July 22, 2003 (abstract in *Health Physics Vol.84, No.8(Supplement)*, p. S200, June 2003).

175. M. J. Stangler, A. Brodsky, and G. Anastas, “Why Traditional Units Must be Used to Train Responders,” presented at the 48th Annual Meeting of the Health Physics Society, San Diego, July 22, 2003 (abstract in *Health Physics Vol.84, No.8(Supplement)*, p. S200, June 2003).

176. A. Brodsky, “Foreword,” in Mark E. Byrnes, David A. King, Philip M. Tierno, Jr. *Nuclear, Chemical, and Biological Terrorism*, Lewis Publishers, Boca Raton, FL, 2003.

177. D. A. Schauer, A. Brodsky, and J.A. Sayeg, “Radiation Dosimetry,” Chapter 15 in M. F. L’Annunziata, Editor, *Handbook of Radioactivity*, Second Edition, Academic Press, New York, 2003.

178. W. J. Klemm, A. Brodsky, and D. M. Schaeffer, “Radioanalytical Data Interpretation When the Ratio Reading/Median is Lognormally Distributed,” *Health Physics* 85(6):721-732; 2003.

179. A. Brodsky, Editor-in-Chief and Dean of the 2004 Health Physics Summer School on “Protecting the Public from Nuclear, Biological and Chemical Terrorism. The Summer School was held July 6-9, 2004, at the National Institute of Standards and Technology, Gaithersburg, MD. There were 44 contributors to the textbook, 26 of whom presented lectures at the Summer School. The textbook, *Public Protection from Nuclear, Chemical, and Biological Terrorism*, edited by Allen Brodsky, Raymond H. Johnson, Jr., and Ronald E. Goans, Medical Physics Publishing, 2004, 832 pp., can be ordered, and two chapters can be read for free, from www.medicalphysics.com. Of the 34 Chapters and 13 Appendices, three chapters and six appendices contributed by Allen Brodsky are:

Allen Brodsky, Chapter 13, “Combining Training Materials for Nuclear Fallout, Radioactivity Dispersing Devices (RDDs), and Radiation Exposure Devices (REDs),”

Allen Brodsky and Niel Wald, M.D., Chapter 20, “Experiences with Early Emergency Response and Rules of Thumb,”

Allen Brodsky and Marlow Stangler, Chapter 31, “Rules of Thumb and Risks of Food and Water Contamination,”

Allen Brodsky, Appendix A.5 – “Gamma and Total Photon Exposure Rates for Point Sources.”

Allen Brodsky, Appendix A.6 – “Simple Algorithms for Relating Surface Concentrations of Gamma Emitters to Exposure Rates, for Circular and Rectangular Areas.”

Allen Brodsky, Appendix A.7 – “Algorithms for Relating Surface Concentrations of Beta Emitters to Count Rates, for Rectangular Detector Windows (or Cross Sections).”

Allen Brodsky , Appendix A.8 -- “ Algorithms for Calculating Fractions of Beta Particles Penetrating Through Various Mass Thicknesses to Tissue Depths or Sensitive Detector Volumes.”

Allen Brodsky, Appendix A.9 – “Dosimetry Equation Summary,”

Allen Brodsky, Appendix A.10 –“Miscellaneous Data for Rapid Dose Estimation and Planning.”

180. Allen Brodsky, “*Easy Calculation of Gamma Exposure Rates Within Homes for Shelter Assessment,*” talk presented at the 49th Annual Meeting of the Health Physics Society in Washington, DC, abstract published in *Health Phys.* Vol. 86, No.6, Supplement, page S164, June 2004.

181. Allen Brodsky, “*Using ICRP, NCRP, and MIRD Formulations for Rapid Dose Estimation in Triage,*” presented at an American Academy of Health Physics Course on “*Dose Assessment in the Aftermath of Radiological and Nuclear Terrorism,*” (a course developed by AB and Ronald E.Goans and presented on February 12, 2005 in New Orleans).

182. Allen Brodsky, “*The Hart Model for Chapter Action on Homeland Security,*” presented at the Midyear Meeting of the Health Physics Society, New Orleans, LA, February 15. 2005.

183. Allen Brodsky, “*Management Lessons Learned from Radiation Accidents,*” presented at the 39th Midyear Meeting of the Health Physics Society, Scottsdale, AZ, January 24, 2006.

PUBLICATIONS ON RADIATION PROTECTION WITHOUT AUTHOR BYLINE

1. *Co-authored several of the early AEC Manual Chapters on permissible levels of exposure and standards for radiation protection, with F. Western, G. V. Beard, and F. R. Zintz, 1957-59.*

2. *Various notices of proposed rulemaking and associated hazard evaluations connected with exemption of certain items containing radioactivity in specified forms and conditions and limited amounts, including:*

Hazard Summary for Tritium in Exempt Safety Devices in Aircraft, 1960.

Hazard Evaluation for Amendment to 10 CFR Part 30 on Exempt Concentration, 1960 Notice of Proposed Rulemaking, 10 CFR Part 30, Exemption of Luminous Timepieces Containing Hydrogen 3 (Tritium), 1960.

(This latter Notice also referenced a hazard evaluation placed in the AEC Public Document Room, which included an analysis of genetic as well as somatic effects in the U.S. as well as the World population resulting from the potential releases of tritium to the biosphere.)

3. *10 CFR Part 20, “Standards for Protection Against Radiation” 1961 Revision, staff task leader and co-author with L. R. Rogers and R. Lowenstein.*

4. *Regulatory Guide 8.18, “Information Relevant to Ensuring that Occupational Radiation Exposures at Medical Institutions Will Be As Low As Reasonably Achievable,” U.S. Nuclear Regulatory Commission (for comment), 1977.*

5. *Regulatory Guide 8.20, “Applications of Bioassay for I-125 and I-131,” U.S. Nuclear*

Regulatory Commission (for comment) April 1978, final Revision 1, 1979.

6. *Regulatory Guide 8.21, "Health Physics Surveys for Byproduct Material at NRC- Licensed Processing and Manufacturing Plants," U.S. Nuclear Regulatory Commission for comment), May 1978; final Revision 1, 1979.*

7. *Regulatory Guide 8.23, "Health Physics Surveys at Medical Institutions," (for comment), 1978., final Revision 1, 1981.*

8. *Regulatory Guide 8.26, "Application of Bioassay for Fission and Activation Products," September 1980.*

9. *Regulatory Guide 10.8, "Guide for the Preparation of License Applications for Medical Programs," (for comment), January 1979, final Revision 1, Oct. 1980.*

10. *Regulatory Guide (draft), "Applications of Bioassay for Tritium," published for comment, 1983; revision incorporating public comments completed and published, 1988.*

11. *Regulatory Guide 8.18, Revision 1, October 1982.*

12. *Regulatory Guide 8.22, "Bioassay at Uranium Mills," (completed revision of 1978 draft incorporating public and staff comments and research results, republished for comment in 1988).*

13. *Regulatory Guide 8.32, "Criteria for Establishing a Tritium Bioassay Program," July 1988.*

14. *Chairman, Working Group, Health Physics Society/ANSI N13.22-1995 standard, "Bioassay Programs for Uranium" (wrote major portion of standard and appendices and incorporated sections by Working Groups members, submitted to standards committee, Aug. 1993, published final with May 1996 Health Physics Society Newsletter).*

15. *Authored Section 6 on program implementation of standard on Internal Dosimetry Programs for Tritium, Health Physics Society, ANSI Standard, 1991.*

16. *Health Physics Society/ANSI N13.30-1995," Performance Criteria for Radiobioassay," (lead statistician and author of Appendices on Minimum Detectable Amount and Criteria for Bias and Precision Statistics). Published with Health Physics Society Newsletter in Fall 1996.*

APPENDIX

Summary of Experience Pertinent to Radiation Emergencies and Radiation Hazard Evaluation

Included in the tasks and responsibilities of the positions listed in the preceding Curriculum Vitae were the following:

1. *Attended special 3-day radiation monitoring course in Nevada for scientific personnel engaged in 1954 H-bomb tests at Eniwetok and Bikini.*
2. *Participated as physicist in the field tests at Eniwetok and Bikini in 1952 and 1954, as well as the scientific instrumentation and analysis of results.*
3. *Was co-organizer and co-instructor for a 6-week radiation monitoring course at Nevada Test Site, 1957, for civil defense officials and responders, course sponsored by Federal Civil Defense Administration.*
4. *As Regional Radiological Defense Officer, Region 2, Federal Civil Defense Administration, helped seven states and District of Columbia and localities prepare emergency civil defense plans for all services, to take into consideration fallout hazards and methods of protection. Attended 1-week Instructor's Course in Emergency Monitoring at Battle Creek and helped conduct other courses and briefings on weapons effects and emergency countermeasures, coordinated with medical, welfare, rescue, first-aid, communications, continuity of government and other services. Participated as member of emergency care at Regional Emergency Operations Center on several alerts, 1956-57.*
5. *Member of Atomic Energy Commission Headquarters Emergency Monitoring Team, 1959-61. Responded to leaking fuel-element cask emergency in Baltimore freight yard and directed interim precautionary measures. Prepared handbook of emergency data included in team kits (TID-8206).*
6. *As Health Physicist, Health Protection Branch, Division of Biology and Medicine, U. S. Atomic Energy Commission Headquarters, one of my ongoing projects was to help write the draft Interagency and AEC-DOD agreement for the national Radiological Assistance Plan for interagency assistance, including the division of responsibility in responding to nuclear weapons incidents and other radiation emergencies upon request of State or local officials. Arranged meetings between agency representatives for my supervisor, Dr. G. V. Beard, who was Chairman of the Committee. Represented the Division of Biology and Medicine, AEC, at final negotiations on AEC-DOD plan and revised final draft accordingly, 1957-59.*
7. *Attended one-week monitoring course for managing plutonium contamination resulting from nuclear weapons incidents, Nevada Test Site, 1961.*
8. *Acted as AEC representative in one week of special exercises and briefings in continuity of government after nuclear attack, 1960.*
9. *Prepared summary of lecture notes of training course of AEC-DOD and other agency radiological assistance teams, National Reactor Testing Station, Idaho, Feb. 12-14, 1958, and prepared "A Compendium of Information for Use in Controlling Radiation Emergencies," TID-8206 (Rev), 1960, 100 pp., which was provided nationally to all radiological teams in program.*
10. *As Health Physicist, Health Protection Branch, Division of Biology and Medicine, U. S.*

AEC, reviewed reactor proposals, hazard evaluation reports and emergency plans of AEC-owned installations. Also, helped establish emergency monitoring, reporting and bioassay criteria.

11. As Radiation Hazards Physicist, Radiation Safety Branch, Division of Licensing and Regulation, U. S. AEC, Washington, DC, reviewed license applications and hazard evaluation reports for all kinds of facilities handling radioactive materials. Helped establish criteria for reviewing hazard evaluation reports including emergency plans and facilities, personnel training and qualifications, analyses of "maximum credible accidents," and facility design and procedures to minimize the consequences of such accidents. Met with company officials and engineers on pre-operation site visits. Wrote several final safety evaluations for publication in Federal Register and Public Document Room. Some of this experience was later incorporated into a proposed systematic framework for hazard evaluation of various types of installations using radioactive materials. AIHA Journal 26, 294- 310, May-June, 1965.

12. As Technical Director, Radiation Medicine Department, Presbyterian University Hospital, Pittsburgh, PA, participated in body burden evaluation by whole-body counting and bioassay, and in determination, after a variety of incidents involving Pu, Am, fission products, U, Th and other nuclides. Also, directed routine whole-body counter operations and analyses for internal radionuclide exposure of employees of atomic energy and medical installations. Participated in radiation dosimetry of accident involving bremsstrahlung from 3 MeV electron Van de Graaf and served as expert witness in radiation injury case. Presented papers on emergency evaluation and management of patients exposed to plutonium-ameridium aerosols after accidents in chemical processes (see publications in attached list).

13. Provided voluntary advice and briefings after Three Mile Island accident to the medical staff at Hershey Medical Center, Hershey, Pennsylvania. The purpose of my advice was to help Professor Kenneth Miller prepare the center to receive any exposed or contaminated patients. The purpose of my briefings was to improve understanding of the TMI situation and reduce some of the prevailing uncertainty and panic already severely affecting the Center at the time of my arrival (Saturday after initial event).

14. Presented two invited papers on Management of Radiation Emergencies and Information Requirements for Emergency Action, and Summary wrap-up, at the 1985 Health Physics Society Summer School, Chicago, IL.

15. Evaluated internal doses from accidental exposures of employees at NRC-licensed installations, as NRC staff scientist, 1975-1986.

16. Prepared draft manual, "Emergency Bioassays for Accidental Exposures to Alpha Emitters," on contract to Brookhaven National Laboratory, 1987-88.

17. Wrote Chapter, "Update on Preparations for Managing Radiation Emergencies," in Coping with Radiation Accidents (Hospital and Community Planning), edited by Michael A. Vince, Envirotox Management, Inc., 149 N. Prospect St., Ravenna, OH 44266, 1990.

18. *Served as Chair, Subcommittee on Radiation Emergencies, Biological Effects Committee, American Association of Physicists in Medicine, about 1987-1993.*
19. *Organized and conducted panel discussion on homeland security at joint meeting of local chapters of Health Physics Society, American Industrial Hygiene Association, American Nuclear Society, and American Association of Physicists in Medicine, at the Uniformed Services University of the Health Sciences, November 28, 2001.*
20. *Appointed Chair of the Ad Hoc Committee on Homeland Security, Health Physics Society, to organize the Committee and propose it as a permanent Standing Committee, December 2001; served as chair to January 2003.*
21. *Director of two AAHP courses at January 2003 Health Physics Society meeting, and one at July 2003 meeting, on topics related to homeland security (see references).*
22. *Academic Dean and Editor-in-Chief, 2004 Summer School of the Health Physics Society, on Protecting the Public from Nuclear, Chemical, and Biological Terrorism, Gaithersburg, MD, July 6-9, 2004.*

SUMMARY OF SUPERVISORY AND MANAGEMENT EXPERIENCE

Supervisory positions listed in this resume included supervision of a variety of job classifications: scientists and other professionals, secretaries, statistical clerks, electronic and other technicians. Handled a wide range of personnel and employment problems with these personnel. Generally motivated and directed them to a high level of performance.

In addition, directly supervised about 30 graduate students as a major advisor during appointments as Associate Professor at the University of Pittsburgh and Professor at Duquesne University, and served as a joint advisor or research committee member to at least 70 others. This included the supervision of physicists, chemists, engineers, industrial hygienists, health physicists, paramedical personnel, and several physicians and dentists. Much of this supervision was on projects with strict deadlines such as graduation, end of project reporting period, end of fellowship, or end of grant. Also, at the University of Pittsburgh, some of this supervision occurred under emergency conditions, directing patient management and measurement during contamination and whole-body counting operations, and during the periods of evaluation for medical treatment, surgery, or chelation therapy. In emergency situations, there were often several students, faculty members, and staff members involved under my overall supervision. Serve at present as Adjunct Professor, Department of Radiation Science, Georgetown University.

Research supervision included guidance in physical science, engineering, applied health physics, and statistical and mathematical methods of data analysis. The types of studies involved ranged from the physical measurement and dosimetry of radiation for both radiation protection and medical physics purposes, to animal and human studies of the uptake and

distributions of radionuclides, and in-hospital and epidemiological follow-up studies on drug efficacy as well as effects of environmental agents of disease.

Guidance and assistance were given to these students on research planning, experimental design, research proposal preparation and defense, equipment selection or construction, data evaluation, and preparation of project reports, publications, talks, essays, and doctoral dissertations.

Budget preparation, scheduling, proposal and project report writing, project briefing, and research and technical project management experience was obtained on a number of projects at the two universities, as well as in positions as President, Health Physics Services, Inc., government and hospital positions, and the scientific projects such as Operations Ivy and Castle. The projects at the universities resulting from proposals written in whole or in part totaled about one million dollars in grants and contracts and several million in subcontracts. Received over \$200,000 in research grants as Principal Investigator. Also, prepared budgets and staffing requirements at universities, hospitals, and the Naval Research Laboratory.

This management experience has been utilized in preparing Federal guidance on proper radiation safety management for hospitals and universities, and is presented in some of the regulatory guides and reports in the publications list.