

8. REFERENCES

- Abbatt JD. 1979. History of the use and toxicity of thorotrast. Environ Res 18:6-12.
- *Abel KJ, Young JA, Rancitelli LA. 1984. Atmospheric chemistry of inorganic emissions. In: Randerson D, ed. Atmospheric science and power production. Oak Ridge, TN: The Technical Information Center, Office of Scientific and Technical Information, U.S. Department of Energy, 423-465.
- Adelglass JM, Samara M, Cantor JO, et al. 1980. Thorotrast induced multiple carcinomatosis of the frontal sinus. Bull NY Acad Med 56:453-457.
- *Aieta EM, Singley JE, Trussell AR, et al. 1987. Radionuclides in drinking water: An overview. Am Water Works Assoc J 79:144-152.
- *Albert R, Klewin P, Fresco J, et al. 1955. Industrial hygiene and medical survey of a thorium refinery. Arch Ind Health 11:234-242.
- *Anderson RF, Bacon MP, Brewer PG. 1982. Elevated concentrations of actinides in Mono Lake (California, USA). Science 216:514-516.
- *APHA/AWWA/WPCF (American Public Health Association/American Water Work Association/Water Pollution Control Federation). 1985. Standard methods for the examination of water and wastewater. 16th ed. Washington, DC: American Public Health Association, 162-164.
- *Archer VE, Wagoner JK, Lundin FE. 1973. Cancer mortality among uranium mill workers. J Occup Med 15:11-14.
- *Arden JW, Gale NH. 1974. Separation of trace amounts of uranium and thorium and their determination by mass spectrometric isotope dilution. Anal Chem 46:687-691.
- *Arnold AG, Oelbaum MH. 1980. Thorotrast administration followed by myelofibrosis. Postgrad Med J 56:124-127.
- *ASTM. 1986. 1986 annual book of ASTM standards, Vol 11.01 (Section 11). Method D2333-80: Test method for thorium in water. American Society for Testing of Materials, 714-717.
- *ATSDR. 1990a. Toxicological profile for thorium. U.S. Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. Atlanta, GA.

*Cited in text

8. REFERENCES

- *ATSDR. 1990b. Toxicological profile for radium. U.S. Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. Atlanta, GA.
- *ATSDR. 1990c. Toxicological profile for radon. U.S. Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. Atlanta, GA.
- *ATSDR. 1990d. Toxicological profile for uranium. U.S. Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. Atlanta, GA.
- Ballou JE, Hursh JB. 1972. The measurement of thoron in the breath of dogs administered inhaled to injected ThO_2 . Health Phys 22:155-159.
- *Barnes D, Bellin J, DeRosa C, et al. 1987. Reference dose (RfD): description and use in health risk assessments. Volume I, Appendix A: Integrated risk information system supportive documentation. Washington, DC: U.S. Environmental Protection Agency, Office of Health and Environmental Assessment. EPA/600/8-86/032a.
- Baserga R, Yokoo H, Henegar GC. 1960. Thorotrast induced cancer in man. Cancer 13:1021-1031.
- YcBaxter PJ, Anthony PP, Macsween RNM, et al. 1980a. Angiosarcoma of the liver: Annual occurrence and aetiology in Great Britain. Br J Ind Med 37:213-221.
- *Baxter PJ, Langlands AO, Anthony PP, et al. 1980b. Angiosarcoma of the liver: A marker tumour for the late effects of Thorotrast in Great Britain Br J Cancer 41:446-453.
- Behari JR, Tandon SK, Mathur AK, et al. 1975. Histological and biochemical alterations in rat's liver and kidney induced by thorium nitrate. Arh Hig Rada Toksikol 26:267-274.
- *BEIR III. 1980. The effects on populations of exposure to low levels of ionizing radiation. Committee on the Biological Effects of Ionizing Radiations, National Research Council. Washington, DC: National Academy Press.
- *BEIR IV. 1988. Health risks of radon and other internally deposited alpha-emitters. Committee on the Biological Effects of Ionizing Radiations, National Research Council. Washington, DC: National Academy Press, 245-275.
- *BEIR V. 1990. Health effects of exposure to low levels of ionizing radiation. Committee on the Biological Effects of Ionizing Radiations, National Research Council. Washington, DC: National Academy Press.

8. REFERENCES

- *Beretka J, Mathew PJ. 1985. Natural radioactivity of Australian building materials, industrial wastes and by-products. Health Phys 48:87-95.
- *Bernabee RP. 1983. A rapid method for the determination of americium, curium, plutonium and thorium in biological and environmental samples. Health Phys 44:688-692.
- *Bigu J. 1985. Radon daughter and thoron daughter deposition velocity and unattached fraction under laboratory-controlled conditions and in underground uranium mines. J Aerosol Sci 16:157-165.
- *Bodek I, Lyman WJ, Reehl RF, et al., eds. 1988. Environmental inorganic chemistry: Properties, processes and estimation methods. SETAC Special Publication Series, New York, NY: Pergamon Press, 9.2-19.
- *Boecker BB. 1963. Thorium distribution and excretion studies. Am Ind Hyg Assoc J 24:155-163.
- *Boecker BB, Thomas RG, Scott JK. 1963. Thorium distribution and excretion studies. II. General patterns following inhalation and the effect of the size of the inhaled dose. Health Phys 9:165-176.
- *Boniforti R. 1987. Lanthanides, uranium, and thorium as possible simulators of the behavior of transuranics in the aquatic environment. Sci Total Environ 64:181-189.
- *Boone IU, Rogers BS, White DC, et al. 1958. Toxicity excretion and tissue distribution of ionium (Th-230) in rats. Am Ind Hyg Assoc J 19:285-295.
- *Bowen JH, Woodward BH, Mossler JA, et al. 1980. Energy dispersive x-ray detection of thorium dioxide. Arch Pathol Lab Med 104:459-461.
- Brody H, Cullen M. 1957. Carcinoma of the breast seventeen years after mammography with thorotrast. Surgery 42:600-606.
- Brown WM, Buckton KE, Langlands AO, et al. 1967. The identification of lymphocyte clones with chromosome structural aberrations in irradiated men and women. Int J Radiat Biol 13:155-169..
- Brues AM. 1979. The long term follow up radium dial painters and thorium workers. Med Bases Radiat Accident Prep:441-450.
- *Buckton KE, Langlands AO. 1973. The Edinburgh Thorotrast series - report of a cytogenetic study. In: 3rd International Meeting: Toxicity of Thorotrast, April 25-27, 1973. RISO Report No. 294, 114-125.
- *Bulman RA. 1976. Concentration of actinides in the food chain. Gov't Rep Announce, Issue 17803. NRPB.R44, 11-12.

8. REFERENCES

- Burnett WC. n.d. US-New Zealand cooperative research into the development and application of a new method for separation of uranium-series isotopes. National Science Foundation, Division of International Programs, Washington, DC.
- Cantor JO, Adelglass J, Cerreta JM, et al. 1981. Collision tumor of the frontal sinus: Evidence of prior intrasinus instillation of thorotrast. *Laryngoscope* 91:798-803.
- *Carpenter R, Beasley TM, Zahnie D, et al. 1987. Cycling of fallout (plutonium, americium-241, cesium-137) and natural (uranium, thorium, lead-210) radionuclides in Washington continental slope sediments. *Geochim Cosmochim Acta* 51:1897-1921.
- CAS. 1990. Chemical Abstract Service. February 14, 1989.
- *Chong CS, Chong HY, Fun HK, et al. 1985. Gamma radioactivity level in Sn slag dumps. *Health Phys* 49:1008-1010.
- *Christensen P, Madsen MR, Jensen OM. 1983. Latency of Thorotrast-induced renal tumours. Survey of the literature and a case report. *Stand J Urol Nephrol* 17:127-130.
- *Clifton RJ, Farrow M, Hamilton EI. 1971. Measurements of Th-232 in normal and industrially exposed humans. *Ann Occup Hyg* 14:303-308.
- *Cochran JK. 1984. The fates of uranium and thorium decay series nuclides in the estuarine environment. *Estuary Filter*, 179-220.
- *Coles DG, Ragaini RC, Ondov JM, et al. 1979. Chemical studies of a stack fly ash from a coal-fired power plant. *Environ Sci Technol* 13:455-459.
- *Conibear SA. 1983. Long term health effects of thorium compounds on exposed workers: The complete blood count. *Health Phys* 44(Suppl 1):231-237.
- *Coorey KD. 1983. Thorotrast granuloma of the neck with local complications. *Med J Aust* 2:580-581.
- *Costa-Ribeiro C, Barcinski MA, Figueiredo N, et al. 1975. Radiobiological aspects and radiation levels associated with the milling of monazite sand. *Health Phys* 28:225-231.
- *Cothorn CR. 1987. Development of regulations for radionuclides in drinking water. In: Graves B ed. Conference: NWWA, April 7-19, Somerset, NJ. Michigan: Lewis Publishers, 1-11.
- *Cothorn CR, Lappenbusch WL, Michel J. 1986. Drinking water contribution to natural background radiation. *Health Phys* 50:33-47.

8. REFERENCES

- *Cottrell WD, Haywood, FF, Witt, et al. 1981. Radiological survey of the Shpack Landfill, Norton, Massachusetts. Report DOE/EV-ORNL-5799, 0005/31. Oak Ridge, TN: Oak Ridge National Laboratory.
- Dahlgren S. 1961. Thorotrast tumors: A review of the literature and report of two cases. Acta Pathol Microbiol Scand 53:147.
- *Dams R, Robbins JA, Rahn KA, et al. 1970. Nondestructive neutron activation analysis of air pollution particles. Anal Chem 42:861-867.
- *da Motta LC, da Silva Horta J, Tavares MH. 1979. Prospective epidemiological study of Thorotrast exposed patients in Portugal. Environ Res 18:152-172.
- *Dang HS, Jaiswal DD, Sunta CM. 1986. Daily intake of thorium by an Indian urban population. Sci Total Environ 57:73-77.
- *da Silva Horta J. 1956. Late lesions in man caused by colloidal thorium dioxide (Thorotrast). Arch Pathol 62:403-418.
- *da Silva Horta J. 1967a. Late effects of Thorotrast on the liver and spleen, and their efferent lymph nodes. Ann NY Acad Sci 145:675-699.
- *da Silva Horta J. 1967b. Effects of colloidal thorium dioxide extravasates in the subcutaneous tissues of the cervical region in man. Ann NY Acad Sci 145:776.
- da Silva Horta J, Moura NJ. 1979. Movement of Thorotrast aggregates in the bone marrow. Environ Res 18:184-191.
- *da Silva Horta J, Cayolla Da Motta L, Tavares MH. 1974. Thorium dioxide effects in man. Epidemiological clinical and pathological studies (Experience in Portugal). Environ Res 8:131-159.
- *Davis MW. 1985. Radiological significance of thorium processing in manufacturing. Report. INFO-0150.
- *Dejgaard A, Krogsgaard K, Jacobsen M. 1984. Venous-occlusive disease and peliosis of the liver after Thorotrast administration. Virchows Archiv Pathol Anat 403:87-94.
- Dougherty JH, Rosenblatt LS. 1971. Long term hematological effects of internal emitters in beagles. Radiation Res 48:319-331.
- Dougherty TF, Stover BJ, Dougherty JH, et al. 1962. Studies of the biological effects of Ra-226 Pu-239 Ra-228 Th-228 and Sr-90 in adult beagles. Rad Res 17:625-681.

8. REFERENCES

- *Downs WL, Scott KJ, Maynard EA, et al. 1959. Studies on the toxicity of thorium nitrate. Report UR-561, Contract W-7401-eng-49. Atomic Energy Project, University of Rochester, Rochester, NY, 1-35.
- Dudley RA. 1978. Bone irradiation in Thorotrast cases: Results of measurements at IAEA. Health Phys 35: 103-112.
- *Early P, Razzak M, Sodee D. 1979. Nuclear medicine technology, 2nd ed. St. Louis: C.V. Mosby Company.
- *Edgington DN. 1967. The estimation of thorium and uranium at the submicrogram level in bone by neutron activation. Int J Appl Radiat Isot 18:11-18.
- *Eichholz G. 1982. Environmental aspects of nuclear power. Ann Arbor, MI: Ann Arbor Science.
- Einck-Rosskamp P, Rajewsky B, Stahlhofen W. 1969. Cross placental passage of radium-228 and its daughters after intravenous injection of colloidal thorium. Aec Symp Ser 17:121-135.
- Ellis LC, Berliner DL. 1967. The effects of ionizing radiations on endocrine cells. Radiation Res 32:520-537.
- *EPA. 1980. U.S. Environmental Protection Agency. Guidelines and methodology used in the preparation of health effect assessment chapters of the consent decree water criteria documents. Federal Register 45:79347-79357.
- *EPA. 1984. Background information document (integrated risk assessment). Final rules for radionuclides. Vol I. U.S. Environmental Protection Agency, Office of Radiation Programs. Washington, DC. EPA 520/1-84-022-1.
- *EPA. 1987. U.S. Environmental Protection Agency. Radiation protection guidance to federal agencies for occupational exposure; approval of Environmental Protection Agency recommendations. Federal Register 52:2823-2834.
- *EPA. 1988a. Technological approaches to the cleanup of radiologically contaminated superfund sites. U.S. Environmental Protection Agency. Office of Research and Development. Washington, DC. EPA 540/2-88-002.
- *EPA. 1988b. Limiting values of radionuclide intake and air concentration and dose conversion factors for inhalation, submersion, and ingestion. Federal Guidance Report No. 11. Washington, DC: U.S. Environmental Protection Agency, Office of Radiation Programs. EPA-520/1-88-020.

8. REFERENCES

- *EPA. 1988c. Maximum contaminant levels for radium-226, radium-228, and gross alpha-particle radioactivity in community water systems. 40 CFR 141.15 Federal Register, 533.
- *EPA. 1989a. Interim Methods for Development of Inhalation Reference Doses. U.S. Environmental Protection Agency, Office of Health and Environmental Assessment. Washington, DC. EPA 600/8-88-066F.
- *EPA. 1989b. Reportable Quantity Adjustment-Radionuclides; Final Rules. Federal Register 54~22524-22543.
- *Ettenhuber E, Lehmann R. 1986. The collective dose equivalent due to the naturally occurring radionuclides in building materials in the German Democratic Republic. Part I: External exposure. Health Phys 50:49-56.
- *Faber M. 1973. Effect of Thorotrast enriched with thorium-230. Dan. AEC., Res Establ Risoe, Risoe Rep 294: 294-302.
- *Faber M. 1979. 28 years of continuous follow-up of patients injected with Thorotrast for cerebral angiography. Environ Res 18:37-43.
- *Falk H, Telles NC, Ishak KG. 1979. Epidemiology of Thorotrast induced hepatic angiosarcoma in the USA. Environ Res 18:67-73.
- *Farid I, Conibear SA. 1983. Hepatic function in previously exposed thorium refinery workers as compared to normal controls from the health and nutrition survey. Health Phys 44(Suppl 1):221-230.
- *Federal Research in Progress. 1990. Databank. July 24, 1990.
- *Filer TD. 1970. Fluorometric determination of submicrogram quantities of thorium. Anal Chem 42:1265-1267.
- *Fischer P, Golob E, Kunze-Muehl E. 1967. Chromosomal aberrations in thorium dioxide patients. Ann NY Acad Sci 145:759-766.
- *Fisenne IM, Perry PM, Decker KM, et al. 1987. The daily intake of ^{234}U , ^{235}U , ^{238}U , ^{228}Th , ^{230}Th , ^{232}Th , and ^{226}Ra , ^{228}Ra by New York City residents. Health Phys 53:357-363.
- *Fisher DR, Jackson PO, Brodaczynski GG, et al. 1983. Level of uranium-234, uranium-238 and thorium 230 in excreta of uranium mill crushermen. Health Phys 45:617-630.
- *Fisher NS, Teyssie JL, Krishnaswami S, et al. 1987. Accumulation of thorium, lead, uranium, and radium in marine phytoplankton and its geochemical significance. Limnol Oceanogr 32:131-142.

8. REFERENCES

Fishman EK, Gayler BW, Kashima HK, et al. 1984. Computed tomography in the evaluation of cervical Thorotrast granuloma. *J Comput Assist Tomogr* 8:224-228.

*Frank AL. 1980. Diseases associated with exposure to metals-thorium. In: Last JMM-R, ed. *Public health and preventive medicine*. 11th ed. New York, NY: Appleton-Century-Crofts, 681-682.

*FRC. 1960. Federal Radiation Council. Radiation protection guidance for federal agencies. *Federal Register* 60:4402-4403.

*Fried JF, Schubert J. 1961. Effect of chelating agent administration on the removal of monomeric and polymeric thorium. *Rad Res* 15:227-235.

*Fruchter JS, Robertson DE, Evans JC, et al. 1980. Mount St. Helen's ash from the 18 May 1980 eruption: Chemical, physical, mineralogical, and biological properties. *Science* 29:1116-1125.

Gaidova ES, Syao-Shan Y. 1970. Morphological changes in the lungs and other organs in rats on intratracheal administration of thorium dioxide. In: Letavet, Kurlyandskaya, eds. *The toxicology of radioactive substances*, Vol. 4. New York: Pergamon Press, 66-82.

*Garten CT Jr. 1978. A review of parameter values used to assess the transport of plutonium, uranium and thorium in terrestrial food chains. *Environ Res* 17:437-452.

*Gilbert GE, Casella VR, Bishop CT, et al. 1985. Isotopes of uranium and thorium, lead-210, and polonium-210 in the lungs of coal miners of Appalachia and the lungs and livers of residents of central Ohio. *Energy Res Abstr* 11:4090.

Gilman JPW, Ruckerbauer GM. 1962. Metal carcinogenesis I: Observations on the carcinogenicity of a refinery dust, cobalt oxide and colloidal thorium dioxide. *Cancer Res* 22:152-156.

*Golchert NW, Iwami FS, Sedlet J. 1980. Determination of actinides in soil. In: Lyon WS, ed. *Radioelement analysis: progress and problems*. 23rd conference: Analytical Chemistry in Energy Technology, Gatlinburg, TN, Oct 9-11, 1979. Ann Arbor, MI: Ann Arbor Science Publishers, Inc., 215-222.

Goren AD, Harley N, Eisenbud L, et al. 1980. Clinical and radiobiologic features of Thorotrast induced carcinoma of the maxillary sinus. *Oral Surg Oral Med Oral Pathol* 49:237-242.

Gossner W. 1982. Thorium II: Biological effects of thorium. In: Galle P, Masse R, eds. *Radionuclide Metab Toxic Proc Symp*. Masson Publ., 273-280.

8. REFERENCES

- *Grampa G. 1967. Liver distribution of colloidal thorium dioxide and development of liver epithelial tumors in rats. *Ann NY Acad Sci* 145:738.
- *Grampa G. 1971. Radiation injury with particular reference to Thorotrast. *Pathol Ann* 6:147-169.
- *Greenberg RR, Kinston HM. 1982. Simultaneous determination of 12 trace elements in estuarine and sea water using pre-irradiation chromatography. In: 1981 International Conference: Modern Trends in Activation Analysis, Part 3, Toronto, Ont, Canada, June 15-16, 1981. *J Radioanal Chem* 71:147-168.
- Gridgeman NT. 1971. Methods of assay of the relative toxicity of certain bone seeking radionuclides. *Radiat Res* 48:291-302.
- *Guimaraes JP, Lamerton LF. 1956. Further experimental observations on the late effects of Thorotrast administration. *Br J Cancer* 10:527.
- *Guimaraes JP, Lamerton LF, Christensen WR. 1955. The late effects of Thorotrast administration: A review and experimental study. *Br J Cancer* 9:253.
- *Gunning C, Scott AG. 1982. Radon and thoron daughters in housing. *Health Phys* 42:527-528.
- *Hall RH, Stroud CA, Scott JK, et al. 1951. Acute toxicity of inhaled thorium compounds. Atomic Energy Project, University of Rochester, Rochester, NY. Report No. UR-190.
- *Hallegot PH, Galle P. 1988. Microanalytical study of thorium 232 deposits in bone marrow and liver. *Rad Environ Biophys* 27:67-78.
- *Hamilton EI. 1971. The relative radioactivity of building materials. *All Ind Hyg Assoc J.* 32:398-403.
- +Hannibal L. 1982. On the radiological significance of inhaled uranium and thorium ore dust. *Health Phys* 42: 367-371.
- *Harley NH, Pasternack BS. 1979. Potential carcinogenic effects of actinides in the environment. *Health Phys* 37:291-300.
- *Harmsen K, De Haan FAM. 1980. Occurrence and behaviour of uranium and thorium in soil and water. *Neth J Agric Sci* 28:40-62.
- *Harrist TJ, Schiller AL, Trelstad RL, et al. 1979. Thorotrast-associated sarcoma of bone: A case report and review of the literature. *Cancer* 44:2049-2058.

8. REFERENCES

- *Hart DR, McKee PM, Burt AJ, et al. 1986. Benthic community and sediment quality assessment of Port Hope Harbor, Lake Ontario (Canada). *J Great Lakes Res* 12:206-220.
- *Hawley GG, ed. 1981. *The condensed chemical dictionary*. 10th ed. New York, NY: Van Nostrand Reinhold, 881, 1021-1022.
- *Hedrick JB. 1985. Thorium. Preprint from Bulletin 675: Mineral facts and problems, 1985 ed. Washington, DC: Bureau of Mines, U.S. Department of the Interior.
- *Hedrick JB. 1987. Thorium. Preprint from the 1987 Bureau of Mines mineral yearbook. Washington, DC: Bureau of Mines, U.S. Department of the Interior.
- Hemphill FM, Hesselgren RD. 1971. Thorotrast quantities and whole body counts. *Health Phys* 21:85-89.
- *Hendee W. 1973. *Radioactive isotopes in biological research*. New York, NY: John Wiley and Sons.
- *Hirose K. 1988. Determination of thorium isotopes in seawater by using preconcentration of thorium-XO complexes on XAD-2 resin. *J Radioanal Nucl Chem-Lett* 127:199-207.
- *Hirose K, Sugimura Y. 1987. Thorium isotopes in the surface air of the western north Pacific Ocean. *J Environ Radioact* 5:459-475.
- *Hobbs C, McClellan RO. 1986. Radiation and radioactive materials. In: Doull J, et al., eds. *Casarett and Doull's Toxicology*, 3rd ed. New York, NY: Macmillan Publishing Co., Inc., 497-530.
- *Hodge HC, Maynard EA, Leach LJ. 1960. The chemical toxicity of thorium dioxide following 'inhalation by laboratory animals. University of Rochester Atomic Energy Project. Report UR-562. University of Rochester, Rochester, NY, 1-33.
- *Hoegerman SF, Cummins HT. 1983. Chromosome damage in peripheral lymphocytes from American thorium workers. *Health Phys* 44(Suppl 1):365-371.
- *HSDB. 1990. Hazardous Substances Data Bank. National Library of Medicine, Washington, DC. February 14, 1989.
- *Hu SJ, Chong CS, Subas S. 1981. U-238 and Th-232 in Cassiterites samples and Amang by-products. *Health Phys* 40:248-250.
- *Hu SJ, Koo WK, Tan KL. 1984. Radioactivity associated with Amang upgrading plants. *Health Phys* 46:452-455.

8. REFERENCES

- *Hu SJ, Kandaiya S. 1985. Radium-226 and ^{232}Th concentration in Amang. Health Phys 49:1003-1007.
- *Huh C-A, Bacon MP. 1985. Determination of thorium concentration in seawater by neutron activation analysis. Anal Chem 57:2138-2142.
- *Huh C-A, Zahnle DL, Small LF, et al. 1987. Budgets and behaviors of uranium and thorium series isotopes in Santa Monica basin (California, USA) sediments. Geochim Cosmochim Acta 51:1743-1754.
- *Hunter KA, Hawke DJ, Choo LK. 1988. Equilibrium adsorption of thorium by metal-oxides in marine electrolytes. Geochim Cosmochim Acta 52:627-636.
- *Hyman C, Paldino RL. 1967. Influence of sex hormones and tissues on colloidal thorium dioxide distribution and effects in rabbits. Ann NY Acad Sci 145:576-584.
- *Ibrahim SA, Whicker FW. 1988. Comparative uptake of U and Th by native plants at a U production site. Health Phys 54:413-419.
- *Ibrahim SA, Wrenn ME, Singh NP, et al. 1983. Thorium concentration in human tissues from two U.S. populations. Health Phys 44(Suppl 1):213-220.
- *ICRP. 1966. International Commission on Radiological Protection. ICRP task group on lung dynamics, depositions and retention models for internal dosimetry of the human respiratory tract. Health Phys 21:173-207.
- *ICRP. 1975. International Commission on Radiological Protection. Report of the Task Group on Reference Man. ICRP Publication 23. New York: Pergamon Press.
- *ICRP. 1977. International Commission on Radiological Protection. Recommendations of the International Commission on Radiological Protection. ICRP Publication No. 26. Vol. 1. No. 3. Oxford: Pergamon Press.
- *ICRP. 1979. International Commission on Radiological Protection. Limits for intakes of radionuclides by workers. ICRP Publication 30. New York: Pergamon Press, 31, 32, 37, 100-101.
- *ICRP. 1979. International Commission on Radiological Protection. Limits for intakes of radionuclides by workers. ICRP Publication 20. Vol 3. No. 1-4. Oxford: Pergamon Press.
- *ICRP. 1984. International Commission on Radiological Protection. A compilation of the major concepts and quantities in use by ICRP. ICRP Publication 42. Oxford: Pergamon Press.
- ICRU. 1980. International Commission on Radiation Units and Measurements. ICRU Report No. 33. Washington, DC.

8. REFERENCES

- *Inn KGW. 1987. The National Bureau of Standards freshwater lake sediment environmental-level radioactivity standard reference material. *J Radioanal Nucl Chem* 115:91-112.
- Ishihara T, Kohno S, Hayta I, et al. 1978. Nine year cytogenetic follow up of a patient injected with Thorotrast. *Hum Genet* 42:99-108.
- *Isner JM, Sazama KJ, Roberts WC. 1978. Vascular complications of thorium dioxide. *Am J Med* 67:1069-1074.
- *Ito Y, Kojiro M, Nakashima T, et al. 1988. Pathomorphologic characteristics of 102 cases of Thorotrast-related hepatocellular carcinoma, cholangiocarcinoma, and hepatic angiosarcoma. *Cancer* 62:1153-1162.
- Jadon A, Mathur R. 1983. Gametogenic count and histo pathological effect of thorium nitrate and uranyl nitrate on mice testes. *Andrologia* 15:40-43.
- *James A. 1987. A reconsideration of cells at risk and other key factors in radon daughter dosimetry. In: Hopke P, ed. *Radon and its decay products: Occurrence, properties and health effects*. ACS Symposium Series 331. Washington, DC: American Chemical Society, 400-418.
- *James A, Roy M. 1988. Dosimetric lung models. In: Gerber G, et al., ed. *Age-related Factors in Radionuclide Metabolism and Dosimetry*. Boston: Martinus Nijhoff Publishers, 95-108.
- *Jee WS, Dockum NL, Mical RS, et al. 1967. Distribution of thorium daughters in bone. *Ann NY Acad Sci* 145:660-673.
- *Jensen L, Regan G, Goranson S, et al. 1984. Ambient monitoring of airborne radioactivity near a former thorium processing plant. *Health Phys* 46:1021-1033.
- *Jiang FS, Kuroda PK. 1987. Variation of the isotopic composition of thorium in the atmosphere. *Radiochim Acta* 42:123-28.
- *Jiang FS, Lee SC, Bakhtiar SN, et al. 1986. Determination of thorium, uranium and plutonium isotopes in atmospheric samples. *J Radioanal Nucl Chem* 100:65-72.
- *Johansen C. 1967. Tumors in rabbits after injections of various amounts of thorium dioxide. *NY Acad Sci* 145:724
- *Johannson L. 1982. Oral intake of radionuclides in the population: A review of biological factors of relevance for assessment of absorbed dose at long term waste storage. FOA Report C40161-W4. DE 83-704553.

8. REFERENCES

- Johannsson W, Perrault G, Savoie L, et al. 1968. Action of various metallic chlorides on calcaemia and phosphataemia. *Br J Pharmacol Chemother* 33:91-97.
- *Johnson JR, Lamothe ES. 1989. A review of the dietary uptake of Th. *Health Phys* 56:165-168.
- *Joshi SR. 1987. Nondestructive determination of selected uranium and thorium-series radionuclides in biological samples. *Health Phys* 53:417-420.
- *Joyet G. 1971. The thorium-series in cigarettes and lungs of smokers. *Experientia* 27:85-89.
- Kamboj MP, Kar AB. 1964. Antitesticular effect of metallic and rare earth salts. *J Reprod Fert* 7:21-28.
- *Kamijo A, Okabe K, Hirose T. 1979. Thorium dioxide granuloma of the neck with resultant fatal hemorrhage. *Arch Otolaryngol* 105:45-47.
- *Kamiyama R, Ishikawa Y, Hatakeyama S, et al. 1988. Clinicopathological study of hematological disorders after Thorotrast administration in Japan. *Blut* 56:153-160.
- Kaneko M, Kamiya Y, Hoshino M, et al. 1981. Identification and mapping of Thorotrast in tissue by analytical electron microscopy. *Health Phys* 41:677-680.
- *Kate I, Kido C. 1987. Increased risk of death in Thorotrast-exposed patients during the late follow-up period. *Jpn J Cancer Res* 78:1187-1192.
- *Kate H, Schull W. 1982. Studies of the mortality of A-bomb survivors. Report 7, Part 1: Cancer mortality among atomic bomb survivors, 1950-78. *Radiat Res* 90:395-432.
- *Kate Y, Mori T, Kumatori T. 1979. Thorotrast dosimetric study in Japan. *Environ Res* 18:32-36.
- *Kate I, Mori T, Kumatori T. 1983. Estimated absorbed dose in tissues and radiation effects in Japanese Thorotrast patients. *Health Phys* 44(Suppl 1):273-279.
- Katzin LI. 1983. Thorium and thorium compounds. In: Grayson M, Eckroth D, eds. *Kirk-Othmer encyclopedia of chemical technology*, vol. 22, 3rd ed. New York, NY: John Wiley and Sons, 989-1002.
- *Kaul A, Heyder J. 1972. Clearance of thorium-232 and daughters from the blood. In: *Symposium: Assessment Radioactive Contam Man*, 469-481.

8. REFERENCES

- *Kaul A, Muth H. 1978. Thorotrast kinetics and radiation dose. Results from studies in Thorotrast patients and from animal experiments. *Radiat Environ Biophys* 15:241-259.
- *Kaul A, Noffz W. 1978. Tissue dose in Thorotrast patients. *Health Phys* 35:113-121.
- Kaul A, Foll U, Haase VA, et al. 1979. Microdistribution of Thorotrast and dose to cellular structures. *Env Research* 18:13-22.
- *Kauzlaric D, Barmeir E, Luscieti P, et al. 1987. Renal carcinoma after retrograde pyelography with Thorotrast. *Am J Radiol* 148:897-898.
- *Keane AT, Brewster DR. 1983. Calibration of a decay-product collection and counting apparatus for the determination of exhaled thoron. *Health Phys* 45:801-805.
- *Keane AT, Lucas HF, Markun F, et al. 1986. The estimation and potential radiobiological significance of the intake of radium-228 by early radium dial workers in Illinois. *Health Phys* 51:313-328.
- *Keller G, Folkerts KH. 1984. Radon-222 concentrations and decay-product equilibrium in dwellings and in the open air. *Health Phys* 47:385-398.
- *Kemmer W. 1979. A field study in 156 Thorotrast cases results of biophysical measurements and clinical examinations. *Environ Res* 18:147-151.
- *Kemmer W, Muth H, Tranekjer F. 1971. Dose dependence of the chromosome aberration rate in Thorotrast patients. *Biophysik* 7:342-351.
- *Kemmer W, Muth H, Trandkjer F, et al. 1973. Chromosome aberrations caused by Thorotrast. In: 3rd International Meeting: Toxicity of Thorotrast, April 25-27, 1973. RISO Report No. 294, 104-113.
- *Kemmer W, Steinstraesser A, Muth H. 1979. Chromosome aberrations as a biological dosimeter in Thorotrast patients: Dosimetric problems. *Environ Res* 18:178-183.
- *Kobashi A, Tominaga T. 1985. Radium-228-thorium-228 dating of plant samples. *Int J Appl Radiat Isot* 36:547-554.
- *Kojiro M, Nakashima T, Ito Y, et al. 1985. Thorium dioxide-related angiosarcoma of the liver. Pathomorphologic study of 29 autopsy cases. *Arch Pathol Lab Med* 109:853-857.
- *Korte N, Kollenbach M, Donovan S. 1983. The determination of uranium, thorium, yttrium, zirconium and hafnium in zircon. *Analyt Chim Acta* 146:267-270.

8. REFERENCES

- *Kotrappa P, Bhanti DP, Menon VB, et al. 1976. Assessment of airborne hazards in the thorium processing industry. *Am Ind Hyg Assoc J* 37:613-616.
- Krey P, Fiseene I, Perry P, et al. n.d. Natural radioactivity in the biosphere. Environmental Measurements Laboratory, New York, NY.
- Kurlyandskaya EB. 1970. Certain aspects of the toxicology of insoluble compounds of thorium-232 and uranium-238. In: Letavet, Kurlyandskaya, eds. *The toxicology of radioactive substances*, Vol. 4. New York: Pergamon Press, 1-8.
- *Kuroda PK, Barbod T, Bakhtiar SN. 1987. Effect of the eruptions of Mount St. Helens and El Chichon on the ratios of thorium and uranium isotopes in rain. *J Radioanal Nucl Chem* 111:137-146.
- *Kyle RH, Oler A, Lasser EC, Rosomoff HL. 1963. Meningioma induced by thorium dioxide. *New Eng J Med* 368:80-82.
- *LaFlamme BD, Murray JW. 1987. Solid/solution interaction: The effect of carbonate alkalinity on adsorbed thorium. *Geochim Cosmochim Acta* 51:243-250.
- *Lambert JPF, Wilshire FW. 1979. Neutron activation analysis for simultaneous determination of trace elements in ambient air collected on glass-fiber filters. *Anal Chem* 51:1346-1350.
- *Laul JC, Smith MR, Thomas CW, et al. 1987. Analysis of natural radionuclides from uranium and thorium series in briney groundwaters. *J Radioanal Nucl Chem* 110:101-112.
- *Lauria DC, Godoy JM. 1988. A sequential analytical method for the determination of uranium-238, thorium-232, thorium-230, thorium-228, radium-228, and radium-226 in environmental samples. *Sci Total Environ* 70:83-99.
- *Levowitz BS, Hughes RE, Alford TC. 1963. Treatment of thorium dioxide granulomas of the neck. *New Eng J Med* 268:340-342.
- *Levy DW, Rindsberg S, Friedman AC, et al. 1986. Thorotrast-induced hepatosplenic neoplasia: CT identification. *Am J Radiol* 146:997-1004.
- *Likhachev YuP. 1976. Pathological anatomy, etiology and pathogenesis of remote sequelae of radiation dust exposure. *Arkh Patol* 38:18-26. [Russian]
- *Likhachev YuP, Lyarskii PP, Elovskaya LT. 1973a. Morphological changes in the lungs with chronic inhalation of thorium dioxide. *Med Radiol* 18:35-41. [Russian]
- *Likhachev YuP, Lyarskii PP, Elovskaya LT. 1973b. Pulmonary neoplasms in rats in chronic inhalation of thorium dioxide. *Vopr Onkol* 19:47-54.

8. REFERENCES

- *Linsalata P, Franca EP, Eisenbud M. 1985. Determination of the human intake of thorium and the light rare earth elements from high and typical natural radiation environments. *Trace Subst Environ Health* 19:257-263.
- Linsalata P, Eisenbud M, Franca EP. 1986. Ingestion estimates of thorium and the light rare earth elements based on measurements of human feces. *Health Phys* 50:163-167.
- *Linsalata P, Penna Franca E, Sachett I, et al. 1987. Radium, thorium, and the light rare earth elements in soils and vegetables grown in an area of high natural radioactivity. *DOE Symp Ser* 59:131-146.
- *Linsalata P, Morse RS, Ford H, et al. 1989. An assessment of soil-to-plant concentration ratios for some natural analogues of the transuranic elements. *Health Phys* 56:33-46.
- *Lipchik EO, Russell SB, Raphael MJ, et al. 1972. Effect of Thorotrast on the canine heart. *Br J Radiol* 45:142-145.
- *Livingston HD, Cochran JK. 1987. Determination of transuranic and thorium isotopes in ocean water in solution and in filterable particles. *J Radioanal Nucl Chem* 115:299-308.
- Lloyd RD, Jones CW, Mays CW, et al. 1984. Thorium-228 retention and dosimetry in beagles. *Radiat Res* 98:614-628.
- *Lloyd RD, Wrenn ME, Taylor GN, et al. 1985. Toxicity of 228Ra and 228Th relative to 226Ra for bone sarcoma induction in beagles. *Strahlentherapie [Sonderb]* 80:65-69.
- *Lucas HF Jr., Edgington DN, Markun F. 1970. Natural thorium in human bone. *Health Phys* 19:739-742.
- Lucas HF Jr, Markun F, May H, et al. 1972. Thorium daughters in the spleen of a Thorotrast case. *Health Phys* 23:575-576.
- *Luetzelschwab JW, Googins SW. 1984. Radioactivity released from burning gas lantern mantles. *Health Phys* 46:873-881.
- *Lung RJ, Harding RL, Herceg SJ, et al. 1978. Long-term survival with Thorotrast cervical granuloma. *J Surg Oncol* 10:171-177.
- Luz A, Linzner U, Miiller WA, et al. 1979. Osteosarcoma induction by simultaneous incorporation of 227Th and 227Ac. Biological implications of radionuclides released from nuclear industries, Vol. 1. International Atomic Energy Agency, Vienna, 141-151.

8. REFERENCES

- *Luz A, Miiller WA, Schaffer E, et al. 1985. The sensitivity of different ages for osteosarcoma induction with Strahlentherapie [Sonderb] 80:178-182.
- itivity of female NMRI
227Thorium.
- *Maletskos DJ, Keane AT, Telles NC, et al. 1969. Retention and absorption of Ra-224 and Th-234 and some dosimetric considerations of Ra-224 in human beings. In: May C, ed. Delayed effects of bone-seeking radionuclides. Salt Lake City, UT: University of Utah Press, 29-49.
- *Mausner LF. 1982. Inhalation exposures at a thorium refinery. Health Phys 42:231-236.
- *Mays CW. 1978. Endosteal dose to Thorotrast patients. Health Phys 35:123-125.
- *Mays CW. 1988. Alpha-particle-induced cancer in humans. Health Phys 55:637-655.
- *Mays CW, Dougherty TF. 1972. Progress in the beagle studies at the University of Utah. Health Phys 22:793-801.
- *Mays CW, Lloyd RD, Taylor GN, et al. 1987. Cancer incidence and lifespan vs. alpha-particle dose in beagles. Health Phys 52:617-624.
- *Mayya YS, Prasad SK, Nambiar PPVJ, et al. 1986. Measurement of ²²⁰Rn in exhaled breath of Th plant workers. Health Phys 51:737-744.
- McClinton LT, Schubert J. 1948. The toxicity of some zirconium and thorium salts in rats. J Pharmacol Exp Ther 94:1-6.
- McInroy JF. n.d. Measurements of plutonium and metals in man. Los Alamos National Laboratory, Los Alamos, NM.
- *McKee PM, Snodgrass WJ, Hart DR, et al. 1987. Sedimentation rates and sediment core profiles of uranium-238 and thorium-232 decay chain radionuclides in a lake affected by uranium mining and milling. Can J Fish Aquat Sci 44:390-398.
- *McNabb GJ, Kirk JA, Thompson JL. 1979. Radio nuclides from phosphate ore processing plants: The environmental impact after 30 years of operation. Health Phys 34:585-587.
- *McNeill KG, Molla MA, Harrison JE. 1973. Distribution of thorium series nuclides in beagles after intraspinal Thorotrast injection. Health Phys 24:403-409.
- Mettler F. 1985. Medical effects of ionizing radiation. New York, NY: Grune and Stratton.

8. REFERENCES

- *Metzger R, McKlveen JW, Jenkins R, et al. 1980. Specific activity of uranium and thorium in marketable rock phosphate as a function of particle size. *Health Phys* 39:69-76.
- *Michael TH, Murray C. 1970. The effects of a blocking agent on the primary immune response. *J Immunol* 105:411-415.
- *Miekeley N, Kuchler IL. 1987. Interactions between thorium and humic compounds in surface waters. *Inorg Chim Acta* 140:315-319.
- *Milic, NB, Suranji TM. 1982. Hydrolysis of the thorium(IV) ion in sodium nitrate medium. *Can J Chem* 60:1298-1303.
- *Moffett D, Tellier M. 1978. Radiological investigations of an abandoned uranium tailings area. *J Environ Qual* 7:310-314.
- *Molla MAR. 1975. Radionuclides in the autopsy samples from Thorotrast patients. *Health Phys* 28:295-297.
- Molla MAR, Harrison JE, McNeill KG. 1976. Doses to the cauda equina due to Thorotrast myelography. *Health Phys* 31:109-114.
- Monath TP, Borden EC. 1971. Effects of Thorotrast on humoral antibody viral multiplication and interferon during infection with St. Louis encephalitis virus in mice. *J Infect Dis* 123:297-300.
- *Moore JW, Sutherland DJ. 1981. Distribution of heavy metals and radionuclides in sediments, water, and fish in an area of Great Bear Lake contaminated with mine wastes. *Arch Environ Contam Toxicol* 10:329-338.
- *Moores SR, Black A, Lambert BE, et al. 1980. Deposition of thorium and plutonium oxides in the respiratory tract of the mouse. *DOE Symp Ser* 53:103-118.
- *Mori T, Kato Y, Shimamini T, et al. 1979. Statistical analysis of Japanese Thorotrast-administered autopsy cases. *Environ Res* 18:231.
- *Mori T, Kato Y, Kumatori T, et al. 1983a. Epidemiological follow-up study of Japanese Thorotrast cases--1980. *Health Phys* 44(Suppl 1):261.-272.
- *Mori T, Kato Y, Aoki N, et al. 1983b. Statistical analysis of Japanese Thorotrast-administered autopsy cases--1980. *Health Phys* 44(Suppl 1):281-292.
- *Müller WA, Gijssner W, Hug O, et al. 1978. Late effects after incorporation of the short-lived alpha-emitters radium-224 and thorium-227 in mice. *Health Phys* 35:33-55.

8. REFERENCES

- Miiller WA. 1971. Studies on short lived internal emitters in mice and rats. *Int J Radiat Bio* 20:233-243.
- *M•ller WA, Nenot JC, Daburon ML, et al. 1975. Metabolic and dosimeter studies after inhalation of Th-227 in rats with regard to the risk of lung and bone tumors. *Radiation Env Biophysics* 11:309-318.
- *M•ller WA, Luz A, Schaffer EH, et al. 1983. The role of time-factor and RBE for the induction of osteosarcomas by incorporated short-lived boneseekers. *Health Phys* 44(Suppl 1):203-212.
- *Munita CS, Mazzilli BP. 1986. Determination of trace elements in Brazilian cigarette tobacco by neutron activation analysis. *J Radioanal Nucl Chem* 108:217-228.
- *Mustonen R, Jantunen M. 1985. Radioactivity of size fractionated fly-ash emissions from a peat- and oil-fired power plant. *Health Phys* 49:1251-1260.
- *Nakaoka A, Fukushima M, Takagi S. 1984. Environmental effects of natural radionuclides from coal-fired power plants. *Health Phys* 47:407-416.
- *NAS/NRC. 1989. Biologic markers in reproducible toxicology. National Academy of Sciences/National Research Council. Washington, DC: National Academy Press, 15-35.
- *NCRP 1971. National Council on Radiation Protection and Measurements. Basic radiation protection criteria. NCRP Report No. 39. Washington, DC.
- *NCRP. 1985. A handbook of radioactivity measurements procedures. 2nd ed. Bethesda, MD: National Council on Radiation Protection and Measurements. NCRP Report No. 58.
- *Neton JW, Ibrahim SA. 1978. Alpha emitting radio nuclides in cigarette tobacco. *Health Phys* 35:922.
- *Newton D, Rundo J, Eakins JD. 1981. Long-term retention of thorium-228 following accidental intake. *Health Phys* 40:291-298.
- Nielsen M, Albrechtsen R, Johnson NJ, et al. 1979. Carcinoma of the parotid gland following sialography with Thorotrast. *Acta Otolaryngol* 88:462-467.
- *Nishioka H. 1975. Mutagenic activities of metal compounds in bacteria. *Mutat Res Sect Environ Mutagen Relat Subj* 31:185-190.
- *NRC. 1988. Nuclear Regulatory Commission. Maximum permissible concentrations for uranium and thorium. 10 CFR 20 151:4115 and 151:4117.

8. REFERENCES

- *Oakes TW, Shank KE, Easterly CE, et al. 1977. Concentrations of radionuclides and selected stable elements in fruits and vegetables. Trace Subst Environ Health 11:123-132.
- *Odegaard A, Ophus EM, Larsen AM. 1978. Identification of thorium dioxide in human liver cells by electron microscopic x-ray microanalysis. J Clin Pathol 31:893-896.
- *Ondov JM, Zoller WH, Olmez I, et al. 1975. Elemental concentrations in the National Bureau of Standards' environmental coal and fly ash standard reference materials. Anal Chem 47:1102-1109.
- *Otake M, Schull W. 1984. Mental retardation in children exposed in utero to the atomic bombs: A reassessment. Technical Report RERF TR 1-83, Radiation Effects Research Foundation, Japan.
- *Parr RM, Lucas HF Jr., Griem ML. 1968. Metabolism of ²³²Th decay series radionuclides in man and other animals following intravascular administration of Thorotrast. ANL-7615. U.S. AEC Argonne Natl Lab, 97-115.
- *Parreira F, De Moura MC. 1979. Morphological study of the bone marrow in patients injected with thorium oxide. Environ Res 18:61-64.
- *Patrick SJ, Cross EM. 1948. Some effects of the administration of thorium nitrate to mice. Can J Res 26:303-316.
- *Pavlovskaja NA. 1973. Basic patterns of the metabolism of Th²³² and its decay products in the body. Gig Sanit 11:55-58. [Russian]
- *Pavlovskaja NA, Makeeva LG, Orlianskaia RL. 1969. Distribution of thorium in rat bones with various routes of administration and different chemical compounds of thorium. Gig Sanit 34:27-31.
- *Pavlovskaja NA, Makeeva LG, Zel'tser MR. 1974a. Excretion of radionuclides of the thorium-232 (thorium-228, radium-224, lead-212) series from a rat's body during the uptake of thorium compounds in respiratory organs. Gig Sanit 9:42-45. [Russian]
- *Pavlovskaja NA, Provotorov AV, Makeeva LG. 1974b. Behavior of thorium-228 and its daughter isotopes in the body of rats when administered perorally. Gig Tr Prof Zabol 5:36-39. [Russian]
- *Percival DR, Martin DB. 1974. Sequential determination of radium-226, radium-228, actinium-227, and thorium isotopes in environmental and process waste samples. Anal Chem 46:1742-1749.
- *Perkins RW, Kalkwarf DR. 1956. Determination of thorium in urine. Anal Chem 28:1989-1993.

8. REFERENCES

- Perry DL, Tsao L. n.d. Thorium species on basalt surfaces. Lawrence Berkeley Laboratory, Berkeley, CA.
- *Peter E, Lehmann M. 1981. Interaction of thorium with blood serum proteins in vivo. Int J Radiat Biol Relat Stud Phys Chem 40:445-450.
- *Peter-Witt E, Volf V. 1984. Efficacy of different diethylenetriaminepentaacetic acid treatment schedules for removal of thorium-234 from simulated wounds in rats. Int J Radiat Biol Relat Stud Phys Chem Med 45:45-50.
- *Peter-Witt E, Wolf V. 1985. Comparison of diethylenetriaminepentaacetic acid calcium chelate and diethylenetriaminepentaacetic acid zinc chelate in removing thorium-234 from the rat. Health Phys 49:395-404.
- Peter-Witt E, Volf V. 1985. The distribution and decorporation of ²³⁴Th in the rat as influenced by the mass of thorium administered. Strahlentherapie [Sonderb] 80:183-185.
- *Petrow HG, Strehlow CD. 1967. Spectrophotometric determination of thorium in bone ash using arsenazo. 3. Anal Chem 39:265-267.
- *Picer M, Strohal P. 1968. Determination of thorium and uranium in biological materials. Anal Chim Acta 40:131-136.
- *Pillai KC, Matkar VM. 1987. Determination of plutonium and americium in environmental samples and assessment of thorium in bone samples from normal and high background areas. J Radioanal Nucl Chem 115:217-229.
- Planas-Bohne F, Taylor DM, Lambie G, et al. 1982. The localization of metallic radionuclides in abscesses in rats. Br J Radiol 55:289-293.
- *Platford RF, Joshi SR. 1986. The chemistry of uranium and related radionuclides in Lake Ontario (USA, Canada) waters. J Radioanal Nucl Chem 106:333-344.
- *Platford RF, Joshi SR. 1988. Dose rates to aquatic life near a uranium waste site. Health Phys 54:63-68.
- Pleskach SD. 1985. Determination of U and Th in urine by neutron activation. Health Phys 48:303-307.
- *Polednak AP, Stehney AF, Lucas HF. 1983. Mortality among male workers at a thorium-processing plant. Health Phys 44(Suppl 1):239-251.
- *Popper H, Thomas LB, Telles NC. 1978. Development of hepatic angiosarcoma in man induced by vinyl chloride, Thorotrast, and arsenic. Comparison with cases of unknown etiology. Am J Pathol 92:349-376.

8. REFERENCES

- *Poston TM. 1982. The bio accumulation potential of thorium and uranium in rainbow trout *Salmo-nairdneri*. Bull Environ Contam Toxicol 28:682-690.
- *Premuzic ET, Francis AJ, Lin M, et al. 1985. Induced formation of chelating agents by *Pseudomonas aeruginosa* grown in presence of thorium and uranium. Arch Environ Contam Toxicol 14:759-768.
- *Rangarajan C, Eapen CD, Gopalakrishnan SS. 1986. Measured values of the dry deposition velocities of atmospheric aerosols carrying natural and fallout radionuclides using artificial collectors. Water Air Soil Pollut 27:305-314.
- *Rae BK, Brodell GK, Haaga JR, et al. 1986. Visceral CT findings associated with Thorotrast. J Comput Assist Tomogr 10:57-61.
- *Raymond DP, Dufield JR, Williams DR. 1987. Complexation of plutonium and thorium in aqueous environments. Inorg Chim Acta 140:309-313.
- *Riedel WR, Hirschberg AK, Kaul A, et al. 1979. Comparative investigations on the biokinetics of colloidal thorium, zirconium, and hafnium dioxides in animals. Environ Res 28:127-139.
- Riedel W, Dalheimer A, Said M, et al. 1983. Recent results of the German Thorotrast study dose relevant physical and biological properties of Thorotrast equivalent colloids. Health Phys 44:293-298.
- *Roeck DR, Reavey TC, Hardin JM. 1987. Partitioning of natural radionuclides in the waste streams of coal-fired utilities. Health Phys 52:311-324.
- *RTECS. 1989. Registry of Toxic Effects of Chemical Substances. February 14, 1989.
- *Rubin P, Casarett G. 1968. Clinical radiation pathology. Philadelphia: W.B. Sanders Company, 33.
- *Ruhmann AG, Berliner DL. 1965. Serum lactic dehydrogenase levels in adult beagle dogs with internally deposited radionuclides. Radiation Res 26:287-294.
- *Sadamori N, Miyajima J, Okajima S, et al. 1987. Japanese patients with leukaemia following the use of Thorotrast including a patient with marked chromosomal rearrangements. Acta Haematologica 77:11-14.
- *Saisho H, Tanaka M, Nakamura K, et al. 1988. Determination of traces of uranium and thorium in microelectronics constituent materials. J Res Natl Bureau Stand 93:398-400.

8. REFERENCES

- *Salaymeh S, Kuroda PK. 1987. Variation of the thorium to uranium ratio in rain: Thorium-230 chronology of the eruptions of Mt. St. Helens and El Chichon volcanoes. *J Radioanal Nucl Chem* 116:261-269.
- *Saldanha MJ, Shah VR, Nambiar PPUJ. 1975. Health Assessment of thorium nitrate plant workers of Indian rare earths. *Indian J Ind Med* 21:114-123.
- *SANSS. 1989. Structure and Nomenclature Search System. February 14, 1989.
- *Santschi PH. 1984. Particle flux and trace metal residence time in natural waters. *Limnol Oceanogr* 29:1100-1108.
- *Santschi PH, Li YH, Adler DM, et al. 1983. The relative mobility of natural (thorium, lead and polonium) and fallout (plutonium, americium, cesium) radionuclides in the coastal marine environment: Results from model ecosystems (MERL) and Narragansett Bay. *Geochim Cosmochim Acta* 47:201-210.
- *Sasaki MS, Takatsuji T, Ejima Y, et al. 1987. Chromosome aberration frequency and radiation dose to lymphocytes by alpha-particles from internal deposit of Thorotrast. *Radiat Environ Biophys* 26:227-238.
- *Schery SD. 1985. Measurements of airborne lead-212 and radon-220 at varied indoor locations within the United States. *Health Phys* 49:1061-1067.
- *Scott JK, Neuman WF, Bonner JF. 1952. The distribution and excretion of thorium sulphate. *J Pharmacol Experi Therapeu* 106:286-290.
- Serio CS, Henninb CB, Toohey RE, et al. 1983. Measurement of lymphoblastogenic activity from thorium workers. *Int J Radiat Biol* 44:251-256.
- Sheppard MI. 1980. The environmental behavior of uranium and thorium. At Energy Can Ltd [Rep.] AECL, AECL-6795.
- *Sill CW. 1977. Simultaneous determination of U-238, U-234, Th-230, Ra-226, and Pb-210 in uranium ores, dusts, and mill tailings. *Health Phys* 33:393-404.
- *Sill CW, Willis CP. 1962. Fluorometric determination of submicrogram quantities of thorium. *Anal Chem* 34:954-964.
- *Simpson HJ, Trier RM, Toggweiler JR, et al. 1982. Radionuclides in Mono Lake, California, USA. *Science* 216:512-514.
- *Simpson HJ, Trier RM, Li YH, et al. 1984. Field experiment determinations of distribution coefficients of actinide elements in alkaline lake environments. *Nucl Waste Geochem*, 326-342.

8. REFERENCES

- Sindelar WF, Costa J, Ketcham AS. 1978. Osteosarcoma associated with Thorotrast administration: Report of two cases and literature review. *Cancer* 42:2604-2609.
- *Singh NP, Wrenn ME. 1988. Determinations of actinides in biological and environmental samples. *Sci Total Env* 70:187-203.
- *Singh, NP, Ibrahim SA, Cohen N, et al. 1979. Simultaneous determination of alpha-emitting radionuclides of thorium plutonium in human tissues including bone. *Analytical Chem* 51:1978-1981.
- *Singh NP, Wrenn ME, Archer VE, et al. 1981. Uranium-238 uranium-234 and thorium-230 in uranium miners' lungs. *Radiat Hazards Min: Control, Meas, Med Aspects, Int Conf* 236-239.
- Singh NP, Wrenn ME, Ibrahim SA, et al. 1982. Thorium concentration in human tissues from two geographic locations of the United States. *Nat Rad Env* 258-268.
- *Singh NP, Wrenn ME, Ibrahim SA. 1983. Plutonium concentration in human tissues: Comparison to thorium. *Health Phys* 44:469-476.
- Singh NP, Bennett D, Saccomanno G, et al. 1985. Concentrations of lead-210 in uranium miners' lungs and its states of equilibria with uranium-238 uranium-234 and thorium-230. *Occup Radiat Saf Min* 2:503-506.
- *Singh NP, Lewis LL, Wrenn ME. 1985. Uranium thorium and plutonium in bones from the general population of the United States. *Comm Eur Communities Issue* 9250:231-241.
- Singh NP, Bennett DB, Wrenn ME, et al. 1986. Concentrations of ^{210}Pb and its states of equilibrium with ^{238}U ^{234}U and ^{230}Th in U miners' lungs. *Health Phys* 51:501-507.
- *Singh NP, Wrenn ME, McInroy JF, et al. 1986. Ratios of ^{234}U , ^{238}U and ^{230}Th in dog lungs exposed to U ore dust: An interlaboratory comparison. *Health Phys* 50:292-297.
- *Singh NP, Bennett DD, Wrenn ME, et al. 1987. Concentrations of alphaemitting isotopes of uranium and thorium in uranium miners' and millers' tissues. *Health Phys* 53:261-266.
- *Singh NP, Zimmerman CJ, Taylor GN, et al. 1988. The beagle: An appropriate experimental animal for extrapolating the organ distribution pattern of Th in humans. *Health Phys* 54:293-299.
- *Sollman T, Brown ED. 1907. Pharmacologic investigations on thorium. *Am J Physiol* 18:426-456.

8. REFERENCES

Spiers FW, Beddow AH, 1983. Sites of incidence of osteosarcoma in the long bones of man and beagle. Health Phys 44:49-64.

*Stannard JN. 1988. Radioactivity and health: A history. DOE/RL/01830-T59.

Stanley RB Jr. 1983. Thorium-dioxide induced pharyngeal hemorrhage. Am J Otolaryngol 4:437-441.

*Stanley RB Jr, Calcaterra TC. 1981. Management of cervical thorium dioxide granulomas. Arch Otolaryngol 107:631-634.

*Stehney AF, Polednak AP, Rundo J, et al. 1980. Health status and body radioactivity of former thorium workers. Argonne, IL, Argonne Natl Laboratory 80-37:44.

*Steinstrasser A. 1981. Biophysical investigations of the dose-effect relationship in chromosome aberrations of human lymphocytes caused by Thorotrast deposits. Radiat Env Biophys 19:1-15.

*Stevens W, Nabors CJ, Jr, Berliner DL. 1967. A comparison of serum transaminase levels and other serum constituents in dogs burdened with 239-Pu, 228-Th, 228-Ra and 226-Ra. NY Acad Sci 145:817-829.

*Stougaard M, Praestholm J, Stoier M. 1984. Late effects of perivascular injection of Thorotrast in the neck. J Laryngol Otol 98:1003-1007.

*Stover BJ. 1981. Toxicology of thorium-228 in young adult beagles: Potential relationship to the thorium fuel cycle. In: Wrenn ME, ed. Actinides in Man and Animals: Proc Snowbird Actinide Workshop. R D Press, University of Utah, Salt Lake City, UT, 483-500.

Stover BJ. 1983. Effects of Thorotrast in humans. Health Phys 44:253-257.

*Stover BJ, Atherton DR, Keller, et al. 1960. Metabolism of Th-228 decay series in adult beagle dogs. Radiation Res 12:657-671.

Stover BJ, Atherton DR, Buster DS, et al. 1965a. The Th-228 decay series in adult beagles: Ra-224, Pb-212 and Bi-212 in selected bones and soft tissues. Radiat Res 26:132-145.

Stover BJ, Atherton Dr, Buster DS, et al. 1965b. The Th-228 decay series in adult beagles: Ra-224, Pb-212 and Bi-212 in blood and excreta. Radiat Res 26:226-243.

*Sullivan MF. 1980a. Absorption of actinide elements from the gastrointestinal tract of rats, guinea pigs and dogs. Health Phys 38:159-171.

8. REFERENCES

- *Sullivan MF. 1980b. Absorption of actinide elements from the gastrointestinal tract of neonatal animals. *Health Phys* 38:173-185.
- *Sullivan MF, Miller BM, Ryan JL. 1983. Absorption of thorium and protactinium from the gastrointestinal tract in adult mice and rats and neonatal rats. *Health Phys* 44:425-428.
- *Summers DE, Chung EB. 1986. Thorotrast associated anemia and bone marrow hypoplasia. *J Natl Med Assoc* 78:1161-1165.
- *Sunta CM, Dang HS, Jaiswal DD. 1987. Thorium in man and environment: Uptake and clearance. *J Radial Nucl Chem* 115:149-158.
- *Sussman S, Terbrugge KG, Solt LC, et al. 1980. Thorotrast induced meningioma case report. *J Neurosurg* 52:834-837.
- Syao-Shan Y. 1970. The effect of thorium dioxide on the peripheral blood of rats. In: Lefavet, Kurlyandskaya, eds. *The toxicology of radioactive substances*, Vol. 4. New York, Pergamon Press, 42-57.
- Syao-Shan, Y. 1970. The effect of thorium dioxide on arterial pressure and threshold of stimulation of the nerve muscle apparatus in rats. In: Lefavet, Kurlyandskaya, eds. *The toxicology of radioactive substances*, Vol. 4. New York, Pergamon Press, 58-65.
- *Syao-Shan Y. 1970a. The behavior of thorium dioxide in rats after intratracheal and intraperitoneal administration. In: Lefavet, Kurlyandskaya, eds. *The toxicology of radioactive substances*, Vol. 4. New York, Pergamon Press, 30-41.
- *Syao-Shan Y. 1970b. Comparative toxicity of soluble and insoluble compounds of thorium-232. In: Lefavet, Kurlyandskaya, eds. *The toxicology of radioactive substances*, Vol. 4. New York, Pergamon Press, 9-19.
- *Tadmor J. 1986. Atmospheric release of volatilized species of radioelements from coal fired plants. *Health Phys* 50:270-273.
- *Tandon SK, Dikshith TSS, Behari JR, et al. 1975. Effect of thorium nitrate in male albino rats. *Ind Health* 13:221-225.
- Tandon SK, Mathur AK, Behari JR, et al. 1975. Thorium induced testicular changes in rats. *Acta Biol Med Ger* 34:1835-1842.
- *Taskayev AI, Popova ON, Alexakhin RM, et al. 1986. Root absorption of radon-222 and its transfer into above ground plant organs. *Health Phys* 50:589-594.

8. REFERENCES

- *Taylor GN, Jee WSS, Christensen WR, et al. 1966. Thorium-228 induced fractures in beagles. Health Phys 12:889-893.
- *Taylor GN, Mays CW, Lloyd RD, et al. 1986. Liver cancer induction by ²⁴¹Am and Thorotrast in deer mice and grasshopper mice. Strahlen Therapie 80(Suppl):172-177.
- *Taylor DM, Chipperfield AR, James AC. 1971. Effects of tetracycline on the deposition of plutonium and related elements in rat bone. Health Phys 21:197-204.
- *Teixeira-Pinto AA, Azevedo e Silva MC. 1979. Chromosome radiation induced aberrations in patients injected with thorium dioxide. Env Res 18:225-230.
- *Telles MC, Thomas LB, Popper H, et al. 1979. Evolution of Thorotrast induced hepatic angiosarcomas. Env Res 18:74-87.
- *Thomas RG. 1957. The metabolism of thorium-230 administered by intratracheal injection to the rat. Rochester, NY, Univ of Rochester, Atomic Energy Project Repor UR-480, 1-26.
- Thomas RG. 1968. Transport of relatively insoluble materials from lung to lymph nodes. Health Phys 14:111-117.
- *Thomas RG, Lie R, Scott JK. 1963. Thorium distribution and excretion studies I. Patterns following parenteral administration. Health Phys 9:153-163.
- Thurman GB, Mays CW, Taylor GN, et al. 1971. Growth dynamics of beagle osteosarcomas. Growth 35:119-125.
- *Torstenfelt B. 1986. Migration of the actinides, thorium, protactinium, uranium, neptunium, plutonium and americium in clay. Radiochem Acta 39:105-112.
- *Traikovich M. 1970. Absorption, distribution and excretion of certain soluble compounds of natural thorium. In: Lefavet, Kurlyandskaya, eds. The toxicology of radioactive substances, Vol. 4. New York, Pergamon Press, 20-29.
- *Twitty BL, Boback MW. 1970. Rapid determination of thorium in urine by thermal neutron activation analysis. Anal Chim Acta 49:19-24.
- *UNSCEAR. 1977. United Nations Scientific Committee on the Effects of Atomic Radiation. Sources and effects of ionizing radiation. United Nations Publication E.77.IX.1. New York, NY: United Nations, 95-96.

8. REFERENCES

- *UNSCEAR. 1982. United Nations Scientific Committee on the Effects of Atomic Radiation. Ionizing radiation: Sources and biological effects. New York, NY: United Nations.
- *UNSCEAR. 1986. United Nations Scientific Committee on the Effects of Atomic Radiation. Genetic and somatic effects of ionizing radiation. New York: United Nations.
- *UNSCEAR. 1988. United Nations Scientific Committee on the Effects of Atomic Radiation. Sources, effects and risks of ionization radiation. New York: United Nations.
- *Van Kaick G, Lieberman D, Lorenz D, et al. 1983. Recent results on the German Thorotrast study-epidemiological results and dose effect relationships in Thorotrast patients. Health Phys 44:299-306.
- Van Kaick G, Wesch H, Luhrs H, et al. 1986. Radiation induced primary liver tumors in Thorotrast patients. Recent Results Cancer Res 100:16-22.
- *Velten RJ, Jacobs BJ. 1982. Determination of thorium in drinking water, Method 910. Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH.
- *VIEW Database. 1989. Agency for Toxic Substances and Disease Registry (ATSDR), Office of External Affairs, Exposure and Disease Registry Branch, Atlanta, GA. June 20, 1989. (Map based on VIEW Database June 12, 1989).
- *Visfeldt J, Poulsen H. 1972. On the histopathology of liver and liver tumors in thorium dioxide patients. Acta Path Micro Stand Sect A:97-108.
- *Vocaturro G, Colombo F, Zanoni M, et al. 1983. Human exposure to heavy metals: Rare earth pneumoconiosis in occupational workers. Chest 83:780-783.
- *Waligorski MPR, Jasinska M, Schwabenthan J. 1985. Enhanced nuclear radiation from camera lenses. Health Phys 49:491-494.
- *Wargotz ES, Sidawy MK, Jannotta FS. 1988. Thorotrast associated gliosarcoma including comments on Thorotrast use and review of sequelae with particular reference to lesions of the central nervous system. Cancer 62:58-60.
- *Weast RC, ed. 1983. CRC handbook of chemistry and physics. 64th ed. Boca Raton, FL: CRC Press, Inc., B149-B150.
- *Wegener K, Wesch H. 1979. Pathological changes of lymph nodes in Thorotrast patients patho anatomical auto radiographical and quantitative investigations. Env Res 18:245-255.

8. REFERENCES

- Wegener K, Hasenohrl K, Wesch H. 1983. Recent results of the German Thorotrast study pathoanatomical changes in animal experiments and comparison to human Thorotrastosis. *Health Phys* 44(Suppl 1):307-316.
- *Wegener K, Wesch H, Kampmann H. 1976. Investigations into human Thorotrastosis tissue concentrations of thorium-232 and late effects in 13 autopsy cases. *Virchows Arch Path Anat Histol* 371:131-143.
- *Weissman SH, Carpenter RL, Newton GJ. 1983. Respirable aerosols from fluidized bed coal combustion: Element composition of fly ash. *Env Sci Tech* 17:65-71.
- *Welford GA, Sutton DC, Morse RS, et al. 1958. Determination of thorium in urine. *Am Ind Hyg Assoc J* 19:464-468.
- *Wesch H, van Kaick G, Riedel W, et al. 1983. Recent results of the German Thorotrast study statistical evaluation of animal experiments with regard to the nonradiation effects in human Thorotrastosis. *Health Phys* 44:317-321.
- *West CM. 1962. An evaluation of the health physics problems from thorium and its daughters in a thorium purification and fabrication process. *Health Phys* 8:279-297.
- *Westin J, Lanner LO, Weinfeld A, et al. 1973. Renal pelvic carcinoma after Thorotrast pyelography: Case report. *Acta Med Scand* 194:141-143.
- *Wang SH. 1988. Effects of some metallic compounds on *Klebsiella*. *Bull Environ Contam Toxicol* 40:525-531.
- *Woodliff HJ, Cohen G, Gallon W. 1972. Chromosome aberrations in lymphocytes from patients exposed to thorium dioxide. *Med J Australia* 2:768-771.
- *Wrenn ME, Singh NP, Cohen N, et al. 1981. Thorium in human tissues. NTIS NUREG/CR-1227, 1-97.
- *Wrenn ME, Singh NP, Saccomanno G. 1983. Uranium and thorium isotopes and their state of equilibria in lungs from uranium miners. *Health Phys* 44:385-389.
- *Wrenn ME, Singh NP, Paschoa AS, et al. 1985. Concentrations of uranium and thorium isotopes in uranium millers' and miners' tissues. NTIS NUREG/CR-4382/GAR, 1-47.
- *Wrenn ME, Taylor GN, Stevens W, et al. 1986. DOE life-span radiation effects studies in experimental animals at University of Utah, Division of Radiobiology. In: Life-span radiation effects in animals: What can they tell us? Conference: U.S. Department of Energy, 830951.

8. REFERENCES

- *Wustrow TP, Behbehani AA, Wiebecks B. 1988. Thorotrast-induced oro- and hypopharyngeal fibrosis with recurrent bleeding. *J.Cranio-Maxillo-Facial Surg* 16:315-319.
- *Yamada S, Hosoda S, Tateno H, et al. 1983. Survey of Thorotrast associated liver cancers in Japan. *J Nat Cancer Inst* 70:31-35.
- *Yang HS, Nozaki Y, Sakai H, et al. 1986. Natural and man made radionuclide distributions in Northwest Pacific deep sea sediments: Rates of sedimentation, bioturbation and radium-226 migration. *Geochem J* 20:29-40.
- *Young WN, Tebrock HA. 1958. The treatment of exposure to thorium and uranium with a chelating agent and supportive measures. *Ind Med Surg (Annual Meeting)* 27:229-232.
- *Zoller WH, Gladney ES, Duce RA. 1974. Atmospheric concentrations and sources of trace metals at the South Pole. *Science* 183:198-200.