

**GEORGE G. KILLOUGH**  
***HENDECAGON CORPORATION***

**Education**

A.B., Mathematics Education, University of North Carolina at Chapel Hill, 1961. Member Pi Mu Epsilon honorary mathematics society.

M.A., Mathematics, University of Tennessee at Knoxville, 1963

One additional year of graduate study under a NASA grant, University of Tennessee at Knoxville, 1963–1964.

**Scientific/technical interests**

Numerical methods, computer simulation of dynamic systems, stochastic modeling of pollutant transport in the environment, radiation dose modeling, probability, and statistics. Programming languages: C, C++, FORTRAN95, Perl.

**Professional Experience**

***Hendecagon Corporation***

(1987–present)

Founder and CEO of Hendecagon Corporation, a consulting firm specializing in innovative applications of mathematical and statistical methods to environmental assessments of radiological and chemical pollutants. Participated in the development of the DECOM and DECHEM programs for radionuclides and chemicals, respectively, in soils, groundwater, and food chain. Provided systems analysis and programming for MICROAIRDOS version 2.0. Through Hendecagon Corporation, served as consultant to Radiological Assessments Corporation (now named Risk Assessments Corporation, RAC) for the Fernald and the Savannah River Site dose reconstruction projects, sponsored by the Centers for Disease Control and Prevention (CDC), and the Rocky Flats dose reconstruction, sponsored by the Colorado Department of Public Health and Environment. Provided simulations and analysis for the Radionuclide Soil Action Level Oversight Panel as partial fulfillment of a contract between RAC and the Rocky Flats Citizen's Advisory Board.

**Oak Ridge National Laboratory**

*Research Staff Member*, Oak Ridge, Tennessee (1974 – July 1987)

Co-edited a major radiological assessment methodology handbook. Provided technical assistance to Liquid Metal Fast Breeder Reactor and High Temperature Gas Cooled Reactor programs by carrying out research in the environmental transport and dosimetry of <sup>14</sup>C released from these fuel cycles. Led the development of the INREM II internal dose methodology for radionuclides released from the LWR fuel cycle; INREM II became the dosimetry basis of the USEPA RADRISK methodology. Led the development of the RAGTIME dynamic food-chain model for radioactive pollutants in agricultural systems. Led the modification of the TACT III accident evaluation code for the U.S. Nuclear Regulatory Commission. Participated extensively in National Science Foundation– and U.S. Department of Energy–sponsored basic research projects in modeling the global carbon cycle for prediction of the “greenhouse effect.” Developed an age-dependent approach to iodine dose reconstruction for application to clinical histories of <sup>131</sup>I exposure for the U.S. Food and Drug Administration. Developed a dynamic global transport model for tritium released to the environment (TRICYCLE). After retiring from the Laboratory, I developed the RAGTIME87 dynamic food-chain model (a reimplementation of the earlier RAGTIME model) and collaborated in the model’s participation in an international validation exercise initiated by the Swedish National Institute for Radiation Protection.

*Consultant*, Oak Ridge, Tennessee (1972–1973)

Consultant to the Environmental Sciences Division. Developed the INDOS codes for implementation of ICRP Publication 10 internal dose methodology.

### **East Tennessee State University**

*Assistant and Associate Professor of Mathematics*, Johnson City, Tennessee (1966–1974)

Conducted courses in analysis, linear algebra, differential equations, numerical methods, and computer science. Contributed to the formulation of curricula and programs for a proposed department of computer science, which was subsequently established. Organized and conducted computer orientation seminars for faculty members. Supervised numerous master’s theses in mathematics and participated in the doctoral program of the College of Education.

### **University of Tennessee at Knoxville**

*Instructor*, Knoxville, Tennessee (1964–1966)

Instructor in mathematics,. Taught courses in calculus, probability theory, ordinary and partial differential equations, complex variable, and calculus of finite differences for students of science and engineering. Consultant to the Health Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

## **Publications**

R.W. Hornung, S.M. Pinney, J. Lodwick, **G.G. Killough**, D.E. Brewer, and J. Nasuta. “Estimation of Radon Exposures to Workers at the Fernald Feed Materials Production Center, 1952–1988.” To appear in *Journal Of Exposure Science And Environmental Epidemiology*.

- G.G. Killough** and P.S. Rohwer. 2006. "14C Dose Coefficients," Letter to the Editor. *Health Physics* 90(3): 273–275.
- G.G. Killough** and D.W. Schmidt. 2000. "Uncertainty Analysis of Exposure to Radon Released from the Former Feed Materials Production Center." *Journal of Environmental Radioactivity* 49: 127–156.
- J.E. Till, **G.G. Killough**, K.R. Meyer, W.K. Sinclair, P.G. Voillequé, S.K. Rope, and M.J. Case. 2000. "The Fernald Dosimetry Reconstruction Project." *Technology* 7: 279–295.
- G.G. Killough**, S.K. Rope, B. Shleien, and P.G. Voillequé. 1999. "Nonlinear Estimation of Weathering Rate Parameters for Uranium in Surface Soil Near a Nuclear Facility." *Journal of Environmental Radioactivity* 45: 95–118.
- J.F. Rogers, **G.G. Killough**, S.J. Thompson, C.L. Addy, R.E. McKeown, and D.J. Cowen. 1999. "Estimating Environmental Exposures to Sulfur Dioxide from Multiple Industrial Sources for a Case Control Study." *Journal of Exposure Analysis and Environmental Epidemiology* 9: 535–545.
- J.F. Rogers and **G.G. Killough**. 1997. "Historical Dose Reconstruction Project: Estimating the Population at Risk." *Health Physics* 72(2): 186–194.
- K.R. Meyer, P.G. Voillequé, D.W. Schmidt, S.K. Rope, **G.G. Killough**, B. Shleien, R.E. Moore, M.J. Case, and J.E. Till. "Overview of the Fernald Dosimetry Reconstruction Project and Source Term Estimates for 1951–1988." *Health Physics* 71(4): 425–437.
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- G.G. Killough**, M.J. Case, K.R. Meyer, R.E. Moore, J.F. Rogers, S.K. Rope, D.W. Schmidt, B. Shleien, J.E. Till, and P.G. Voillequé. 1993. *The Fernald Dosimetry Reconstruction Project—Task 4: Environmental Pathways—Models and Validation*. RAC Report No. CDC-3, Radiological Assessments Corporation, Neeses, South Carolina.
- P.G. Voillequé, K.R. Meyer, D.W. Schmidt, S.K. Rope, **G.G. Killough**, M.J. Case, R.E. Moore, B. Shleien, and J.E. Till. 1995. *The Fernald Dosimetry Reconstruction Project—Tasks 2 and 3: Radionuclide Source Terms and Uncertainties*. RAC Report No. CDC-5, Radiological Assessments Corporation, Neeses, South Carolina.
- G.G. Killough** and D.C. Kocher. 1988. "A Model for Global Cycling of Tritium." *Fusion Technology* 14(2/2B): 1115–1120.
- G.G. Killough** and D.E. Dunning, Jr. 1987. "Analysis of Uncertainties in CRAC2 Calculations: The Inhalation Pathway." In: *Uncertainty in Risk Assessment, Risk Management, and Decision Making* (V.T. Covello, L.B. Lave, A. Moghissi, and V.R.R. Uppuluri, Eds.), 287–303. Plenum Press, New York.
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- D.C. Kocher, R.C. Ward, **G.G. Killough**, D.E. Dunning, Jr., B.B. Hicks, R.P. Hosker, Jr., J.-Y. Ku, and K.S. Rao. 1987. "Sensitivity and Uncertainty Studies of the CRAC2 Computer Code." *Risk Analysis* 7(4): 497–507.

- G.G. Killough** and D.C. Kocher. 1986. "Global Environmental Transport Models for Tritium." *Fusion Technology* **8**(2/2): 2569–2574.
- G.G. Killough** and K.F. Eckerman. 1986. "An Age- and Sex-dependent Model for Estimating Radioiodine Dose to a Normal Thyroid." In: *Fourth International Radiopharmaceutical Dosimetry Symposium — Proceedings of a Conference Held at Oak Ridge, Tennessee, November 5–8, 1985* (A.T. Schlafke-Stelson and E.E. Watson, eds.), pp. 613–627. CONF-851113 (DE86010102), Oak Ridge Associated Universities, Oak Ridge, TN.
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- C.F. Baes, Jr., and **G.G. Killough**. 1986. "Chemical and Biological Processes in CO<sub>2</sub> Ocean Models." Chapter 17 in: *The Changing Carbon Cycle — A Global Analysis* (J.R. Trabalka and D.E. Reichle, eds.), pp. 329–347. Springer-Verlag, New York.
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- G.G. Killough**, J.E. Till, E.L. Etnier, B.D. Murphy, and R.J. Raridon. 1984. "Dose Equivalent due to Atmospheric Releases of Carbon-14." Chapter 11 in: *Models and Parameters for Environmental Radiological Assessments* (C.W. Miller, ed.). DOE/TIC-11468, U.S. Department of Energy, Washington, DC.
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- J.E. Till, H.R. Meyer, E.L. Etnier, E.S. Bomar, R.D. Gentry, **G.G. Killough**, P.S. Rohwer, V.J. Tennery, and C.C. Travis. 1980. *Tritium — An Analysis of Key Environmental and Dosimetric Questions*. ORNL/TM-6990, Oak Ridge National Laboratory, Oak Ridge, TN.
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- J.E. Till and **G.G. Killough**. 1978. “Scenarios of  $^{14}\text{C}$  Releases to the Atmosphere by the World Nuclear Industry and Estimated Radiological Impacts.” In: *Tagungsbericht Radioaktivität und Umwelt, 12. Jahrestagung, Norderney, 2.–6. Oktober 1978, Fachverband für Strahlenschutz e.V.: 680–695*. Norderney, Federal Republic of Germany.
- G.G. Killough** and J.E. Till. 1978. “Scenarios of  $^{14}\text{C}$  Releases from the World Nuclear Power Industry from 1975 to 2020 and the Estimated Radiological Impact.” *Nuclear Safety* **19**: 602–617.
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