

EDMUND A.C. CROUCH, Ph.D.

EDUCATION:

1975. Ph.D., University of Cambridge, England, High Energy Physics, (Thesis: "The Algebraic Structure of Some Dual Resonance Models").

1972. B.A., University of Cambridge, England, Natural Sciences (Theoretical Physics).

PROFESSIONAL EXPERIENCE:

1989–Present. Senior Scientist, Cambridge Environmental Inc., Cambridge, Massachusetts.

1987–Present. Associate of the Department of Physics, Harvard University, Cambridge, Massachusetts.

1992–1994. Lecturer in the Department of Epidemiology, Harvard University School of Public Health.

1990–1992. Assistant Professor of Community Health, Tufts University School of Medicine, Boston, Massachusetts.

1987–1989. Senior Scientist, Environmental Health and Toxicology Group, Meta Systems Inc., Cambridge, Massachusetts.

1979–1986. Research Associate In Physics, Jefferson Physical Laboratory, Harvard University, Cambridge, Massachusetts.

1977–1979. Research Fellow in Physics, Jefferson Physical Laboratory, Harvard University, Cambridge, Massachusetts.

1984–1986. Consulting Associate in Risk Assessment, Meta Systems Inc., Cambridge, Massachusetts.

1974–1977. Research Fellow in the Energy Research Group, Cavendish Laboratory, University of Cambridge, Cambridge, England.

NATIONAL ACADEMY OF SCIENCE COMMITTEES

Committee on Health Effects of Waste Incineration, Board on Environmental Studies and Toxicology, Commission on Life Sciences, National Research Council. 1995–1999. (*Waste Incineration and Public Health*, National Academy Press, 2000).

Committee on Risk-Based Criteria for Non-RCRA Hazardous Waste, Board on Environmental Studies and Toxicology, Commission on Life Sciences, National Research Council. 1998–1999. (*Risk-Based Waste Classification in California*. National Academy Press, 1999).

Committee on Toxicology, Subcommittee on the Atsugi Incinerator, Board on Environmental Studies and Toxicology, Commission on Life Sciences, National Research Council. 2000. (*Review of the US Navy's Human Health Risk Assessment of the Naval Air Facility at Atsugi, Japan*, National Academy Press, 2001).

Committee on an Assessment of CDC's Radiation Studies from DOE Contractor Sites: Review the Identification and Prioritization of Radionuclide Releases from the Idaho National Engineering and Environmental Laboratory (September 30, 2000) Report. 2001. (*Letter Report to the CDC: Review Identification and Prioritization of Radionuclide Releases from the Idaho National Engineering and Environmental Laboratory*, National Academy Press, 2001).

Committee on An Assessment of Centers for Disease Control and Prevention Radiation Studies: Review of a Research Protocol Prepared by the University of Utah, Board on Radiation Effects Research, Division on Earth and Life Studies, National Research Council. 2001–2002. (*Review of a Research Protocol Prepared by the University of Utah: Letter Report*, National Academy Press, 2002).

Committee to Review Methods for Estimating Radiation Doses to Workers at Hanford, Board on Radiation Effects Research, Division on Earth and Life Studies, National Research Council. 2001. (*Letter Report: Review of Methods for Estimating Radiation Doses to Workers at Hanford*, National Academy Press, 2002).

Committee to Review the Identification of Radionuclides released from the Hanford Nuclear Reservation's Facilities to the Columbia River, Board on Radiation Effects Research, Division on Earth and Life Studies, National Research Council. 2002 (*Letter Report: Review of the Identification of Radionuclides Released from the Hanford Nuclear Reservation's Facilities to the Columbia River*, National Academy Press, 2002)

Committee to Review the CDC-NCI Feasibility Study of the Health Consequences to the American Population from Nuclear Weapons Tests, Board on Radiation Effects Research, Division on Earth and Life Studies, National Research Council. 2002.

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(Exposure of the American Population to Radioactive Fallout from Nuclear Weapons Tests, National Academy Press, 2003)

Committee on Superfund Site Assessment and Remediation in the Coeur D'Alene River Basin, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council, 2004–2005. *(Superfund and Mining Megasites — Lessons from the Coeur d'Alene River Basin, National Academy Press, 2005).*

Committee to review ATSDR's Great Lake Reports, Board on Population Health and Public Health Practices, Institute of Medicine. (Letter Report: Review of ATSDR's Great Lakes Report Drafts, National Academies Press, 2008).

Committee on the Health Risks of Phthalates, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council, 2007–2008 (Phthalates and cumulative risk assessment -- The Task Ahead. National Academies Press, 2008).

SELECTED PROJECT EXPERIENCE:

- Managed and wrote several site risk assessments for Massachusetts and Federal Superfund sites.
- Managed and wrote several risk assessments for Waste-to-Energy plants.
- Designed and wrote the probabilistic risk assessment for FSIS, USDA, on the risk of *C. Perfringens* in Ready-to-Eat and Partially Cooked Foods.
- Designed the theory and implemented in computer code a site assessment tool (called RISK-ON-SITE™) that uses Voronoi diagrams to assist in estimating risks from soil and groundwater on a site. Provided suitable color displays to allow rapid evaluation of the available data on a site. Extended the methodology to give risk-based estimates of required clean-up levels.
- Developed simple algorithms (theory and computer implementation) for air-dispersion modeling to account rapidly and adequately for area sources. Applied these and full EPA air dispersion algorithms in RISK-ON-SITE™ for a site in California.
- Performed statistically correct comparisons of metals concentrations in groundwater upgradient and downgradient of a Superfund landfill site, and showed that the entire apparent difference in mean concentrations was accounted for by the skewness of the distribution and the larger number of samples taken downgradient.

- Derived and used in risk assessments and in support of various litigations many quantitative exposure assessments involving transport and fate of chemicals in the natural (for example: air, soil, groundwater, surface water) and man-made (for example: indoor and outdoor air) environment.
- Wrote and maintain a software package (MSTAGE) to evaluate the results of carcinogenesis bioassays in laboratory animals. This package is flexible enough to incorporate the standard EPA methodologies, but may also be used with more advanced methodologies incorporating uncertainty correctly.
- Performed full uncertainty analyses of cancer risk assessments for several chemicals and in several situations, incorporating all the known uncertainties in a consistent fashion.
- Provided expert technical comments on proposed EPA rules in such areas as exposure assessment (for example: for landfill leachate and landfill gas), and risk assessment methodology (for example, as applied to the Hazard Ranking System).

SELECTED PRESENTATIONS:

Green, L., and Crouch, E.A.C. Health risk assessment perspectives on chlorinated ethylenes: Focus on perchloroethylene toxicity values. Presented at Risk Analysis: The Science and the Art, Society for Risk Analysis 2008 Annual Meeting, Westin Boston Waterfront Hotel, Boston, MA.

Crouch, E., LaBarre, D., Dearfield, K., Kause, J., and Golden N. A demonstration of the application of a two-dimensional risk assessment for estimating of risk management metrics for food safety. Presented at Risk Analysis: The Science and the Art, Society for Risk Analysis 2008 Annual Meeting, Westin Boston Waterfront Hotel, Boston, MA.

SELECTED ORIGINAL REPORTS:

Crouch, E.A.C., Green, L.C., and Galanter, J.M. (2009). Technical Comments on U.S. EPA's "Risk and Exposure Assessment to Support the Review of the SO₂ Primary National Ambient Air Quality Standards: Second Draft" (March 2009), Docket No. EPA-HQ-OAR-2007-0352. Available on www.regulations.gov as Attachment 1 in EPA-HQ-OAR-2007-0352-0031.1.

Crouch, E. and Green, L. (2009). A Proposition 65 dose evaluation for DEHP from shoes. Cambridge Environmental Inc.

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Crouch, E. and Green, L. (2009). A Proposition 65 risk evaluation of lead in guitar strings with an addendum that addresses risk from ball-ends. Cambridge Environmental Inc.

Crouch, E.A., LaBarre, D., Golden, N.J., Kause, J.R., and Dearfield, K.L. (2009). Application of Quantitative Microbial Risk Assessments for Estimation of Risk Management Metrics: *Clostridium perfringens* in Ready-to-Eat and Partially Cooked Meat and Poultry Products as an Example. *Journal of Food Protection* 72(10):2151-2161.

Golden, N.J., Crouch, E.A., Latimer, H., Kadry, A-R., and Kause, J. (2009) Risk assessment for *Clostridium perfringens* in Ready-to-Eat and Partially Cooked meat and poultry products. *Journal of Food Protection* 72(7):1376–1384.

Crouch, E., Green, L., and Hendrix, S. (2008). A Proposition 65 no-significant-risk evaluation of 1,4-dioxane in assorted consumer products. Cambridge Environmental Inc.

Crouch, E. and Green, L. (2008). A Proposition 65 no-significant-risk evaluation of 1,4-dioxane in dish liquid. Cambridge Environmental Inc.

Crouch, E.A.C., Zemba, S.G. and Bullister, E.T. (2008). Source term model for fine particles off indoor surfaces. Cambridge Environmental Inc.

Crouch, E. (2007). Comments on Docket APHIS-2007-0112: “Risk assessment for the importation of fresh lemon (*Citrus limon* (L.) Burm. F.) fruit from Northwest Argentina into the Continental United States. USDA, APHIS, August 6, 2007.” Docket APHIS-2007-0112-0020.1. December 10, 2007. Cambridge Environmental Inc.

Crouch, E. (2007). Technical memorandum, overview of draft sensitivity analysis for the Tittabawassee Human Health Risk Assessment for Dioxins/Furans. Cambridge Environmental Inc.

Crouch, E. (2007). Comments on Docket APHIS-2007-0022: “Evaluation of asymptomatic citrus fruit (*Citrus* spp.) as a pathway for the introduction of citrus canker disease (*Xanthomonas axonopodis* pv. *citri*); USDA, APHIS, Revision 2, April, 2007, APHIS-2007-0022-0002,” and “Movement of commercially packed citrus fruit from Citrus Canker Disease Quarantine Area, Risk Management Analysis; USDA, APHIS, June 2007, APHIS-2007-0022-0003.” Docket APHIS-2007-0022-0069.1. August 7, 2007. Cambridge Environmental Inc.

Crouch, E.A.C. and Green, L.C. (2007). Comment on "Persistent organic pollutants in 9/11 world trade center rescue workers: reduction following detoxification" by James Dahlgren, Marie Cecchini, Harpreet Takhar, and Olaf Paepke [*Chemosphere* 69/8 (2007) 1320–1325]. *Chemosphere* 69(8):1330–2.

- Crouch, E. (2006). Comments on Docket APHIS–2006–0045: “Evaluation of asymptomatic citrus fruit (*Citrus* spp.) as a pathway for the introduction of citrus canker disease (*Xanthomonas axonopodis* pv. *citri*); USDA, APHIS, March 20, 2006.” Docket APHIS-2006-0045-13.1. July 3, 2006. Cambridge Environmental Inc.
- Crouch, E.A.C., Lester, R.R., Sahay, S., and Baron, J. (2006). Method 3 risk characterization W.R. Grace & Company property. Cambridge Environmental Inc.
- Popp, J.A., Crouch, E., and McConnell, E.E. (2006). A weight-of-evidence analysis of the cancer dose-response characteristics of 2,3,7,8-tetrachlorodibenzodioxin (TCDD). *Toxicol. Sci.* 89(2)361–369.
- Green, L.C. and Crouch E.A.C. (2005). Estimating cancer risks from toxic air contaminants. *EM(June):23–27*.
- Crouch, E. and Golden, N.J. (2005). A Risk Assessment for *Clostridium perfringens* in Ready-to-Eat and Partially Cooked Meat and Poultry Products. September, 2005. Available from http://www.fsis.usda.gov/Science/Risk_Assessments/index.asp.
- Green, L.C., Crouch, E.A.C., Zemba, S.G., Ames, M.R., Satterstrom, K. and Linkov, I. (2004). MATES-II: a review and analysis for the staff of the Federal Highway Administration. Cambridge Environmental Inc.
- Green, L.C. and Crouch, E.A.C. (2004). Comments for the External Peer Review Panel regarding the Draft Toxicological Review of Naphthalene: In: *Support of Summary Information on the Integrated Risk Information System (IRIS)*. Cambridge Environmental Inc.
- Crouch, E.A.C., Zemba, S.G., Ames, M.R., and Green, L.C. (2002). Comments on *Proposed Methodology for Particulate Matter Risk Analyses for Selected Urban Areas*, by Abt Associates, January 2002. Cambridge Environmental Inc.
- Green, L.C., Crouch, E.A.C., Ames, M.R., and Lash, T.L. (2002). What's wrong with the National Ambient Air Quality Standard (NAAQS) for fine particulate matter (PM_{2.5})? *Regulatory Toxicology and Pharmacology* 35:327–337.
- Green, L.C., Ames, M.R., and Crouch, E.A.C. (2001). Comments on “Mortality Risk Reductions and Economic Benefits of Alternative SAMI Air Quality Strategies.” Cambridge Environmental Inc.
- Alvarado, M.J., Armstrong, S., and Crouch, E. (2001). The AMSA 2000/2001 survey of dioxin-like compounds in biosolids: statistical analyses. Cambridge Environmental Inc.

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Crouch, E., Ames, M., and Green, L.C. (2001). A quantitative health risk assessment for the Kalamazoo River PCB site. Cambridge Environmental Inc.

Crouch, E.A.C. (2000). A cost allocation scheme and its application to the Cal Compact Site. Cambridge Environmental Inc.

Crouch, E.A.C. and Armstrong, S.R. (2000). Review of exposure assessments for Cry9C protein in StarLink Corn. Cambridge Environmental Inc.

Valberg, P., Crouch, E., Green, L., and Zemba, S. (2000). Review of the health impacts projected in the Levy *et al.* report: "*Estimated public health impacts of criteria pollutant air emissions from the Salem Harbor and Brayton Point power plants.*" Cambridge Environmental Inc.

Lester, R.R. and Crouch, E.A.C. (2000). Firm yield estimator — version 1.0 software documentation. Cambridge Environmental Inc.

Crouch, E.A.C. and Zemba, S. (2000). Comments to the Science Advisory Board Residual Risk Applications Subcommittee on "*A Case Study Residual Risk Assessment for EPA's Science Advisory Board Review: Secondary Lead Smelter Source Category.*" Cambridge Environmental Inc.

Crouch, E., Armstrong, S., and Zemba, S. (1999). Comments on EPA's proposed standards for the use of disposal of sewage sludge. Cambridge Environmental Inc.

Crouch, E., Armstrong, S., Lester, R., and Burmaster, D. (1999). Comments on "Importation of Fresh Citrus Fruit (Sweet Orange, Citrus sinensis, Lemon, C. limon, and Grapefruit, C. paradisi) from Argentina into the Continental United States: Supplemental Plant Pest Risk Assessment." Cambridge Environmental Inc.

Bartlett, K.L. and Crouch, E.A.C. (1999). Human health risk assessment for the future Wyndham Gardens Hotel, Chelsea, Massachusetts. Exposure to volatile contaminants in groundwater. Cambridge Environmental Inc.

Valberg, P.A. and Crouch, E.A.C. (1999). Meta analysis of rat lung tumors from lifetime inhalation of diesel exhaust. *Environmental Health Perspectives* 107:693.699.

Bartlett, K.L., Zemba, S.G., Crouch, E.A.C., and Green, L.C. (1999). Health risk assessment for Davenport Commons Development, Boston, MA. Cambridge Environmental Inc.

Bartlett, K.L., Zemba, S.G., Crouch, E.A.C., and Green, L.C. (1999). Health risk assessment for Shawmut Estates, Boston, MA. Cambridge Environmental Inc.

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Bartlett, K.L., Zemba, S.G., Crouch, E.A.C., and Green, L.C. (1998). Health risk assessment for Phase III Orchard Park Development, Boston, MA. Cambridge Environmental Inc.

Crouch, E. (1998). Health and environmental risks due to MGP contamination at the City of Newburgh Sewage Treatment Plant. Cambridge Environmental Inc.

Crouch, E. and Burmaster, D. (1998). Aggregate exposure assessment — an approach. Cambridge Environmental Inc.

Zappia, A.M., Lester, R.R., Zemba, S.G., Crouch, E.A.C., and Green, L.C. (1997). Human health risk assessment for BASF Corporation, Third Street, Clifton, NJ. Cambridge Environmental Inc.

Green, L.C. and Crouch, E.A.C. (1997). Probabilistic risk assessment: lessons from four case studies. In: Preventive Strategies for Living in a Chemical World. *Annals of the New York Academy of Sciences*, 837:387–396.

Bartlett, K.L., Zemba, S.G., Crouch, E.A.C., and Green, L.C. (1997). Health risk assessment for Phase I Orchard Park Development, Boston, MA. Cambridge Environmental Inc.

Bartlett, K.L., Zemba, S.G., Crouch, E.A.C., and Green, L.C. (1997). Health risk assessment for Phase II Orchard Park Development, Boston, MA. Cambridge Environmental Inc.

Burmaster, D.E., and Crouch, E.A.C. (1997). Lognormal distributions for body weight as a function of age for males and females in the United States, 1976–1980. *Risk Analysis* 17:499–505.

Crouch, E.A.C., Lester, R.R., Lash, T.L., Armstrong, S.R., and Green, L.C. (1997). Health risk assessments prepared *per* the risk assessment reforms under consideration in the U.S. Congress. *Human and Ecological Risk Assessment* 3(5):713–785.

Green, L.C., Crouch, E.A., Lester, R.R., Lash, T. L., and Armstrong, S.R. (1997) Letter from America: Can health risk assessment be improved, and should it? *European Safety and Reliability Association Newsletter*, p. 6–8.

Lash, T.L., Crouch, E.A., and Green, L.C. (1997). A meta-analysis of the relation between cumulative exposure to asbestos and relative risk of lung cancer. *Occupational and Environmental Medicine* 54:254–263.

Armstrong, S.R., Zemba, S.G., and Crouch, E.A.C. (1996). Acute health effects assessment for the Plainville Landfill. Cambridge Environmental Inc.

- Crouch, E. and Lester, R. (1996). Comments of *Cambridge Environmental Inc. on the proposed rule — Hazardous waste management system: Identification and listing of hazardous waste: Hazardous waste identification rule (60FR66344)*. Docket F-95-WHWP-FFFF. Cambridge Environmental Inc.
- Crouch, E.A.C. (1996). Uncertainty distributions for cancer potency factors: laboratory animal carcinogenicity bioassays and interspecies extrapolation. *Human and Ecological Risk Assessment* 2:103–129.
- Crouch, E.A.C. (1996). Uncertainty distributions for cancer potency factors: combining epidemiological studies with laboratory bioassays — the example of acrylonitrile. *Human and Ecological Risk Assessment* 2:130–149.
- Zemba, S.G., L.C. Green, E.A.C. Crouch, and R.R. Lester (1996). Quantitative risk assessment of stack emissions from municipal waste combustors. *J. Haz. Materials* 47:229–275.
- Crouch, E.A.C. and Green, L.C. (1995). Properly accounting for uncertainty in current methods of risk assessment. In: Lee, S.D. and Schneider, T., ed(s), *Comparative Risk Analysis and Priority Setting for Air Pollution Issues*. Proceedings of the 4th U.S.-Dutch International Symposium, Keystone, Co. Pittsburgh, PA: Air & Waste Management Association.
- Green, L.C., Crouch, E.A.C., and Lester, R.R. (1995). The carcinogenic potencies of 2,3,7,8-tetrachlorodibenzo-p-dioxin: letting the data speak for themselves. In: *Solid Waste Management: Thermal Treatment & Waste-to-Energy Technologies, Proceedings of an International Specialty Conference*, p. 251–261.
- Crouch, E.A.C. and Green, L.C. (1995). Comments on *Estimating exposures to dioxin-like compounds*. Cambridge Environmental Inc.
- Crouch, E., Green, L., Lester, R., and Zemba, S. (1995). Clean-up levels for the Norwood PCBs Superfund Site — a risk-based approach. Cambridge Environmental Inc.
- Crouch, E.A.C., Lester, R.R., Lash, T.L., Armstrong, S.R., and Green, L.C. (1995). Report to the Commission on Risk Assessment and Risk Management. Health risk assessments prepared per the risk assessment reforms under consideration in the U.S. Congress. Cambridge Environmental Inc.
- Crouch, E., Green, L., Zemba, S., and Lester, R. (1995). Comments to the Science Advisory Board on U.S. EPA's development of human health based and ecologically based exit criteria for the hazardous waste identification project, review draft, March 3, 1995. Cambridge Environmental Inc.

- Crouch, E.A.C. and Lester, R.R. (1995). An MCP risk characterization for the former Amoco Service Station # 4175, 1060 Worcester Road, Framingham, MA. Cambridge Environmental Inc.
- Crouch, E., Green, L., Zemba, S., Armstrong, S., and Gaffey, K. (1995). Some further comments on Development of human health based exit criteria for the hazardous waste identification project phase III analysis. Cambridge Environmental Inc.
- Green, L.C., Crouch, E.A.C., Armstrong, S.R., and Lester, R.R. (1995). Comments on *Health assessment document for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and related compounds: review draft*. Cambridge Environmental Inc.
- Green, L.C., Crouch, E.A.C., Armstrong, S.R., Lash, T.L., and Lester, R.R. (1995). Comments on *Estimating exposure to dioxin-like compounds: review draft*. Cambridge Environmental Inc.
- Green, L.C., Crouch, E.A.C., and Lester, R.R. (1995). The carcinogenic potency of 2,3,7,8-TCDD and similar compounds: *Comments on health assessment document for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and related compounds*. Cambridge Environmental Inc.
- Green, L.C., Crouch, E.A.C., and Lester, R.R. (1995). The carcinogenic potencies of 2,3,7,8-tetrachlorodibenzo-p-dioxin: letting the data speak for themselves. In *Solid Waste Management: Thermal Treatment & Waste-to-Energy Technologies, Proceedings of an International Specialty Conference*, p. 251–261.
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- Crouch, E.A.C., Green, L.G., Zemba, S.G., Luis, S.J., Perkins, K.K., and Lash, T. (1994). Comments on *Addendum to the methodology for assessing health risks associated with indirect exposure to combustor emissions*. Cambridge Environmental Inc.
- Zemba, S.G., Perkins, K.K., Armstrong, S.R., Crouch, E.A.C., Lester, R.R., and Green, L.C. (1994). A health risk assessment for the *Capital District* integrated solid waste management facility. Cambridge Environmental Inc.

- Crouch, E., Zemba, S., Armstrong, S., Perkins, K., and Burmaster, D. (1994). Some initial comments on *Development of human health based exit criteria for the hazardous waste identification project phase II analysis*. Cambridge Environmental Inc.
- Zemba, S.G., Perkins, K.K., Lash, T.L., and Green, L.C. (1994). A preliminary health risk assessment for the NEPERA Incinerator, Harriman, NY. Cambridge Environmental Inc.
- Crouch, E.A.C., Green, L.C., Zemba, S.G., Luis, S.J., Perkins, K.K., and Lash, T. L. (1994). Probabilistic risk assessment of combustor stack emissions. Cambridge Environmental Inc.
- Green, L.C., Armstrong, S.R., Crouch, E.A.C., Lash, T.L., Luis, S.J., Perkins, K.K., and Zemba, S.G. (1993). Protocol for a multi-pathway risk assessment for the WTI Facility in East Liverpool, OH. Cambridge Environmental Inc.
- Green, L.C., Crouch, E.A., Zemba, S.G., Perkins, K.K., and Armstrong, S.R. (1993). Comments on *Estimating exposure to dioxin-like compounds: review draft*. Cambridge Environmental Inc.
- Zemba, S.G., Crouch, E.A.C., and Green, L.C. (1993). An integrated approach to meeting risk-based cleanup goals at a lead-contaminated site. Proceedings of the 86th Annual Meeting of the Air & Waste Management Association, Denver, CO, June 13–18.
- Crouch, E.A.C., Jaffe, D., and Luis, S.J. (1992). Risk assessment for the Somersworth Municipal Landfill, Somersworth, New Hampshire. Cambridge Environmental Inc.
- Armstrong, S.R., Zemba, S.G., Crouch, E.A.C., and Green, L.G. (1992). Health evaluation of the Halifax Municipal Landfill. Cambridge Environmental Inc.
- Crouch, E. (1992). Use of animal data for estimating human risk. Lecture notes from "Risk Analysis in Environmental and Occupational Health", Sept. 9, 1992, Harvard School of Public Health.
- Crouch, E.A.C., Croy, R., Pilkington, M., and Zemba, S. (1992). Baseline risk assessment for the Abex site. Cambridge Environmental Inc.
- Crouch, E.A.C., Zemba, S.G., Pilkington, M., Jaffe, D., and Green, L.C. (1992). Comments on *Hazardous Waste Management System: identification and list of hazardous waste; proposed rule 57 FR 21450*. Cambridge Environmental Inc.

Crouch, E.A.C., Green, L.C., Jaffe, D., Lash, T.L., Luis, S.J., and Pilkington, M.B.G. (1992). Interim report on an assessment of risks to health potentially associated with exposure to Oil 55 that may leak from a Myers submersible pump in a water well. Cambridge Environmental Inc.

Crouch, E.A.C., Jaffe, D., Luis, S.L., and Zemba, S.G. (1992). Risk assessment for the North Berwick Municipal Garage uncontrolled hazardous substances site, North Berwick, ME. Cambridge Environmental Inc.

Crouch, E.A.C. and Wilson, R. (1992). Comments on *Draft report: a cross-species scaling factor for carcinogen risk assessment .. Notice" 57FR 24141*. Cambridge Environmental Inc.

Green, L.C., Crouch, E.A.C., Zemba, S.G., and Parsons, A.P. (1992). Estimating exposures to dioxin-like compounds. Letter to Editor. *Municipal Solid Waste News 14(11):13-14*.

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Crouch, E.A.C., and Zemba, S.G. (1991). A Proposition 65 assessment for 234 East Main Street, Ontario, CA. Cambridge Environmental Inc.

Crouch, E.A.C., DeVoto, E., Green, L.C., and Zemba, S.G. (1991). Phase II risk characterization for the USM site, Beverly, MA. Cambridge Environmental Inc.

Armstrong, S.R., Crouch, E.A.C., DeVoto, E., Green, L.C., and Lash, T.L. (1990). Comments on *the ATSDR's draft health assessment guidance manual*. Cambridge Environmental Inc.

Crouch, E.A.C., DeVoto, E., Green, L.C., and Zemba, S.G. (1990). A health risk assessment of the proposed East Bridgewater integrated waste-disposal system. Cambridge Environmental Inc.

Crouch, E.A.C., and D. Spiegelman (1990). The evaluation of integrals of the form

$$\int_{-\infty}^{\infty} f(t) \exp(-t^2) dt : \text{application to logistic-normal models. } J. Am. Stat. Assoc. 85:464-469.$$

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Crouch, E.A.C., DeVoto, E., Green, L.C., and Kaden, D.A. (1989). Comments on U.S. EPA's proposed national emission standards for hazardous air pollutants — benzene waste operations. Cambridge Environmental Inc.

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Crouch, E.A.C., Green, L.C., and Lash, T.L. (1989). Assessment of health risks due to perchloroethylene contamination of groundwater beneath Shaw's Supermarket property, West Street, Brockton, MA. Environmental Health and Toxicology Group, Meta Systems Inc.

Baer, S.N., Crouch, E.A.C., Green, L.C., and Lash, T.L. (1989). Health risk characterization, 211 Central Street, Norwood, MA. Environmental Health and Toxicology Group, Meta Systems Inc.

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