

*Synopsis of Significant Works & Contributions
on PPCPs and Emerging Contaminants*

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(also see Curriculum Vitae: <http://www.epa.gov/nerlesd1/bios/daughton.htm>)

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**Pharmaceuticals and Personal Care Products (PPCPs)
as Environmental Contaminants**

"PPCPs" as environmental contaminants: the acronym was coined for "pharmaceuticals and personal care products" in this first synoptic review of PPCPs; subtle effects were first postulated as a major concern [1999]

<http://www.epa.gov/nerlesd1/bios/daughton/errata.pdf>

Book on PPCPs: among the first two books on PPCPs (as an outcome from the first all-day conference on PPCPs in North America, 219th ACS National Meeting, 27 March 2000) [2001]

<http://www.epa.gov/nerlesd1/bios/daughton/book.htm>

PPCPs overview: an update to the original 1999 review article [2001]

<http://www.epa.gov/nerlesd1/bios/daughton/book-summary.htm>

Research needs and gaps for PPCPs: first comprehensive examination (arranged around the risk assessment paradigm) [2004]

<http://www.epa.gov/nerlesd1/bios/daughton/researchneeds-chapter.pdf>

PPCPs in drinking water: first comprehensive review; assessment of ramifications for human health [2008]

<http://www.epa.gov/nerlesd1/bios/daughton/EoPH2008.pdf>

PPCPs in ground water: drug residues in reused/recycled water; ramifications for human health and perception of risk [2004]

<http://www.epa.gov/nerlesd1/bios/daughton/water-reuse.pdf>

PPCPs sources and origins: review of the pathways of entry to the environment [2007]

http://www.epa.gov/nerlesd1/bios/daughton/Chap1_Petrovic&Barcelo.pdf

"Pseudopersistence": concept first introduced [2002, 2003]

<http://www.epa.gov/nerlesd1/bios/daughton/lancet-page.pdf>

<http://www.epa.gov/nerlesd1/bios/daughton/green1.pdf>

Aquatic bioconcentration of PPCPs: First synoptic review of the literature [2009 - in press]
Daughton CG and Brooks BW "Pharmaceutical Active Ingredients in Aquatic Organisms,"
Chapter in: Bayer N and Meador J. (eds), Environmental Contaminants in Biota:
Interpreting Tissue Concentrations, 2nd Ed., Taylor and Francis; submitted, March 2009

Previously unrecognized pathways to the environment and routes to human exposure for certain pharmaceuticals; sweat and dermal transfer first identified as routes of release and exposure [2009 - in press]
http://www.setacjournals.org/archive/1552-8618/preprint/2009/pdf/10.1897_08-382.1.pdf

"*pharmEcokinetics*": concept introduced as an umbrella interconnecting all the transformation processes that pharmaceutical ingredients undergo during therapy and in the environment [2009 - in press]
http://www.setacjournals.org/archive/1552-8618/preprint/2009/pdf/10.1897_08-382.1.pdf

PPCPs in a reference book: first presentation of topic targeted to high-school and college students [2003]
<http://www.epa.gov/nerlesd1/bios/daughton/Macmillan-PPCPs.pdf>

Illicit drugs and "sewage forensics": introduction of new tool using sewage monitoring for illicit drugs to estimate community-wide usage (dose reconstruction); sometimes later erroneously termed sewer "epidemiology" [2001]
<http://www.epa.gov/nerlesd1/bios/daughton/book-conclude.htm>

PPCPs published-literature database: largest publically available compilation of citations [19 February 2008-present]
<http://www.epa.gov/ppcp/lit.html>

Web site devoted to PPCPs: first PPCPs web site created in April 2000 and subsumed by the US EPA's current PPCPs web site on 18 July 2007 [2000-present]
<http://www.epa.gov/ppcp>

"*Literature forensics*": critical importance to science of the thorough examination of the literature [2001]
<http://www.epa.gov/nerlesd1/bios/daughton/forensics.pdf>

Pharmaceutical Waste Management/Disposal and Environmental Stewardship

PPCPs and environmental stewardship: topic first introduced to the medical literature [2001]
<http://www.epa.gov/nerlesd1/bios/daughton/lancet-page.pdf>

"Green Pharmacy": concept first introduced; comprehensive approach for environmental stewardship, pollution prevention, and waste reduction for pharmaceuticals [2003]
<http://www.epa.gov/nerlesd1/bios/daughton/green1.pdf>
<http://www.epa.gov/nerlesd1/bios/daughton/green2.pdf>

"pharmEcovigilance": concept first introduced - linking protection of the environment with the quality of medical care and the environment [2008]
Daughton CG and Ruhoy IS "The Afterlife of Drugs and the Role of PharmEcovigilance," *Drug Safety*, 2008, 31(12):1069-1082; doi:10.2165/0002018-200831120-00004.
<http://www.epa.gov/nerlesd1/bios/daughton/IntroEnvironPharmacol-Chapter1-2008.pdf>
<http://www.epa.gov/nerlesd1/bios/daughton/IntroEnvironPharmacol-Chapter5-2008.pdf>

Medication site-accumulation and disposal: first comprehensive examination of where and why [2008]
<http://www.epa.gov/nerlesd1/bios/daughton/EnvInt2008.pdf>

Medication waste: consumer sources and waste management [2007]
http://www.epa.gov/nerlesd1/bios/daughton/Chap1_Petrovic&Barcelo.pdf

Drug disposal data: first comprehensive summary for a particular sub-population of a single metropolitan area over the span of a year [2008]
<http://www.epa.gov/nerlesd1/bios/daughton/EnvInt2008.pdf>

Coroner office drug data: first methodology for measuring the disposal of drugs to sewage and the overall contribution of drug waste disposal to environmental contamination [2007]
<http://www.epa.gov/nerlesd1/bios/daughton/SOTE2007.pdf>

Drug disposal: options available to the consumer [2009]
Glassmeyer ST, Hinchey EK, Boehme SE, Daughton CG, Ruhoy IS, Conerly O, Daniels RL, Lauer L, McCarthy M, Nettesheim TG, Sykes K, and Thompson VG. "Disposal Practices for Unwanted Residential Medications in the United States," *Environ. Internat.*, 2009, 35(3): 566-572; doi:10.1016/j.envint.2008.10.007

Medication use and sustainability: chapter in first book devoted to sustainability and pharmaceutical usage [2009]
<http://www.epa.gov/nerlesd1/bios/daughton/Pharmaceuticals-Sustainability-2009.pdf>

Co-organized the first national conference on drug disposal [2005]

U.S. EPA Workshop: Pharmaceuticals in the Environment, Office of Research and Development, National Exposure Research Laboratory, Las Vegas, NV, 23-25 August 2005

First presentation for Drug Enforcement Administration on science behind PPCPs [2006]

Daughton, C.G. "Pharmaceuticals as Environmental Contaminants: An Overview of the Science," invited presentation for: End User Drug Disposal Conference, organized by the Drug Enforcement Administration, Seattle Field Division, Portland District Office, Portland, OR, 25-26 April 2006

Emerging Contaminants

"*Emerging pollutants*": one of the first papers published on this topic; first working definition presented for "emerging pollutants" **[2001]**

http://www.epa.gov/nerlesd1/bios/daughton/book_jasma.pdf

A perspective on what's meant by "emerging contaminants" [2009]

[http://www.epa.gov/nerlesd1/bios/daughton/Daughton-EmCon09 \(March09\).pdf](http://www.epa.gov/nerlesd1/bios/daughton/Daughton-EmCon09%20(March09).pdf)

Additional perspectives on emerging and non-regulated contaminants [2004, 2005, 2006]

<http://www.epa.gov/nerlesd1/bios/daughton/EIAR.pdf>

http://www.epa.gov/nerlesd1/bios/daughton/emerging_contaminants.pdf

http://www.norman-network.net/newsletters/newsletter_norman_1.pdf