

US ENVIRONMENTAL PROTECTION AGENCY - NATIONAL WATER PROGRAM RESEARCH COMPENDIUM - 2009 - 2014

SEPTEMBER 30, 2008

Page 37 “Of growing concern across the National Water Program is the ability to identify **emerging contaminants**, both biological (pathogens, invasive species) and chemical (pharmaceuticals, pesticides) not only in water **but in land-applied biosolids**, septage, and manure. Continued research is needed to develop techniques that are accurate, precise, and suitable for these different environmental matrices. In particular, the development of more reliable and faster methods for identifying pathogens and pathogen indicators is a **research priority because of the acute health effects of pathogens**.

[Prions are pathogens:

[Pedersen, Joel A.](#) - 12 visits - Sep 28

Aug 17, 2010 ... (13) Russo, F.; Johnson, C.J.; Johnson, C.J.; McKenzie, D.; Aiken, J.M.; Pedersen, J.A. Degradation of the **pathogenic prion** protein by a .. }

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Emerging Contaminants Emerging contaminants refer broadly to those synthetic or naturally occurring chemicals, or to any microbiological organisms, that are new to the environment or that have not previously been monitored for or recognized in the environment, **but are of concern because of their known or suspected adverse ecological or human health effects.**

These contaminants, by definition, are insufficiently understood to determine their need for control and regulation. **Two key groups of emerging contaminants of concern, discussed in this *Compendium*, are the Endocrine Disrupting Chemicals (EDCs) and the Pharmaceutical and Personal Care Products (PPCPs). Others emerging contaminants include nanomaterials, fluorinated compounds, and pathogens – various protozoa, bacteria, viruses, and prions.**



Method Development ▪ Testing procedures or models for evaluating emerging contaminants fate and effects. ▪ Assess the quality and utility of data, tools, and methods used for risk assessments for **new and unique contaminants**, such as **prions and nanomaterials**.

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Emerging contaminants (e.g., endocrine disrupting compounds, PPCP, nanoparticles, and prions) are another area of concern. They have come under increasing scrutiny over the last decade, and **there are growing concerns over the fate of these emerging contaminants in land-applied biosolids, septage, and manure.** Pathogens and nutrients in residuals also require management. Excessive discharges of nutrients to water bodies result in eutrophication, with associated degradation of water quality. Management options for residuals include various treatment and disinfection processes

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POTWS - EMERGING CONTAMINANTS - NANOMATERIALS - ANTIBIOTIC RESISTANCE -

Ongoing work is needed to determine the effectiveness of existing treatment technologies in removing or inactivating current and emerging contaminants. Of particular importance is whether storage or attenuation after publicly owned treatment works (POTWs) treatment results in pathogen die-off. Continued research is also needed to assess the quality and utility of data, tools, and methodologies used for pathogen risk assessments **including those needed to evaluate other emerging contaminants (e.g., prions and nanomaterials).** Another treatment-related research question involves antimicrobial resistance in

wastewater streams and how they impact the treatment process. The effects of nanomaterials on POTWs needs to be assessed, as well as the abilities of nanomaterials to survive the treatment process and appear in products produced from land-applied biosolids.

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The universe of emerging contaminants includes many (*i.e.*, hundreds to thousands) biotic and abiotic constituents for which EPA needs to determine pollutant status. Determining whether an emerging contaminant will be classified as a pollutant will depend on having adequate data to conduct an exposure and hazard assessment in appropriate environmental media. The list of emerging contaminants is long. It includes, among others, endocrine disrupting compounds, nanomaterials, fluorinated compounds, pharmaceutical and personal care products (PPCPs), viruses, **prions**, bacteria (*e.g.*, *E. coli*, *E. coli* 0157:H7, enterococci), and protozoa (*e.g.*, *Giardia* and *Cryptosporidium*).

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All OW (Office of Water) programs have expressed the need for new and improved methods to be able to more specifically identify pathogens in drinking water, including distribution systems and biofilms, in ambient and recreational waters, wastewaters and biosolids that are land applied and may contribute agents into the environment. Research is needed to assess how well culture and molecular methods (singly or in combination) may perform. Especially with new molecular methods this work must consider the specificity and sensitivity of the methods and how they can address viability (and infectivity) of the pathogens. Similarly, methods must be developed to begin **to assess emerging pathogens (from viruses to prions, for example)**. Chemicals
Consideration of any new or revised drinking water or water quality

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Others emerging contaminants include nanomaterials, fluorinated compounds, and pathogens – various protozoa, bacteria, viruses, **and prions.**

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Continued research is also needed to assess the quality and utility of data, tools, and methods used for risk assessments for **new and unique contaminants, such as prions and nanomaterials.** This research must support the development of standards for human health protection (*e.g.*, drinking water) as well as aquatic life guidelines.

http://www.epa.gov/aging/resources/presentations/2009_1117_ed_ohanian_apha_1110.pdf

CONTAMINANTS OF EMERGING CONCERN IN WATER

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PFOAS (Perfluorooctanoic acid) See Alabam class action by farmers - 5000 acres land, water, livestock - contaminated by PFOAs in sewage sludge -- Dalton, Georgia - production of Class A sludge discontinued because of PFOA contamination

PHARMACEUTICALS AND PERSONAL CARE PRODUCTS

NANOMATERIALS

PESTICIDES

ENDOCRINE DISRUPTING COMPOUNDS

PRIONS

PBDES - (Polybrominated diphenyl ethers)
