# Risks of Sewage Sludge Disposal on Farmland : The Case for Caution

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# History of My Involvement in "Sludge Science"

## The Early Years

- 1970's - Interest in soil chemistry of heavy and trace metals led to participation in Northeast Regional Project NE-96 with scientists from all Northeastern states
- 1985- Involved in publication of the Northeast Guidelines ("Criteria and Recommendations for Land Application of Sludges in the Northeast", Bull. 851)

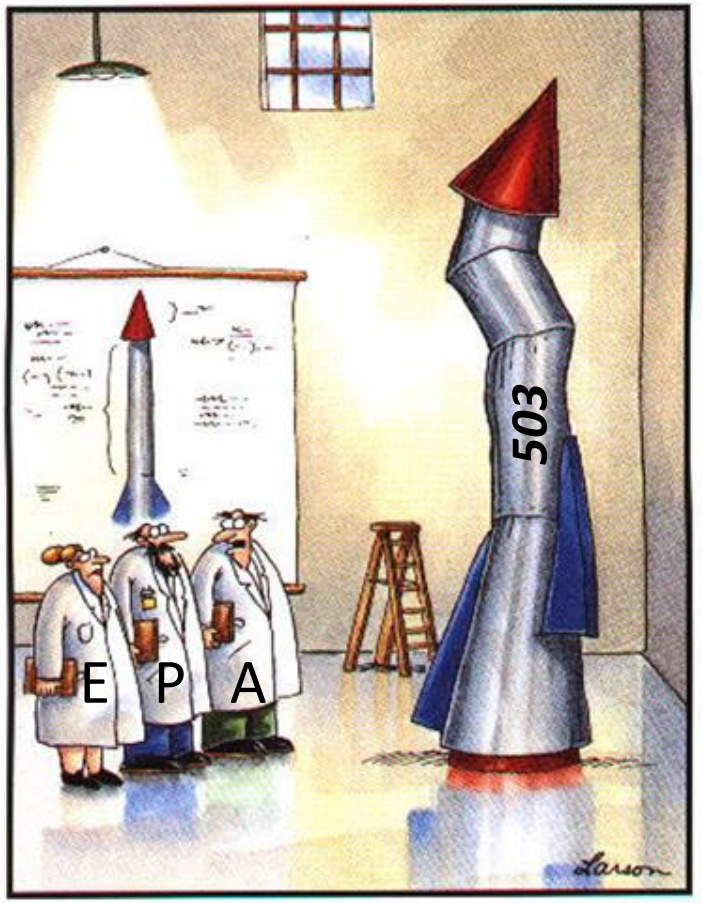
## Post 503 Rule

- 1993- the newly promulgated EPA 503 rule proves to be much less cautious than Northeast guidelines
- 1995- questioned the EPA risk assessment behind the 503 Rule in publication : " Toxic metal accumulation from agricultural use of sludge: are EPA regulations protective? JEQ (cited > 500 times)
- After 1995 : Conducted numerous field and greenhouse studies on food and forage crop uptake of zinc, cadmium, molybdenum and other metals from sludge and sludge-lime products.

# Involvement with CWMI

- 1997- worked with Ellen Harrison of CWMI to produce a working paper titled the “Case for Caution”, published later in slightly revised form
- 2002- Proposed revisions to
  NY State DEC Part 360
  Waste Management Rules
- 2008- posted on CWMI website

the “Case for Caution Revisited”, detailing more recent (post 503 rule) research relevant to sludge contaminant behavior in soils




“It’s time we face reality, my friends. ... We’re not exactly rocket scientists.”

*With apologies*
*To Gary Larson*

U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF INSPECTOR GENERAL

# More Action Is Needed to Protect Water Resources From Unmonitored Hazardous Chemicals

**Report No. 14-P-0363** **September 29, 2014**

U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF INSPECTOR GENERAL

*Cleaning up and revitalizing land*

# EPA Unable to Assess the Impact of Hundreds of Unregulated Pollutants in Land-Applied Biosolids on Human Health and the Environment

**Report No. 19-P-0002** **November 15, 2018**

**The EPA identified 352 pollutants in biosolids but cannot yet consider these pollutants for further regulation due to either a lack of data or risk assessment tools. Pollutants found in biosolids can include pharmaceuticals, steroids and flame retardants.**

## USEPA OFFICE of INSPECTOR GENERAL REPORT , Nov. 2018

**"Despite the data and control weaknesses, the EPA implies that, when used correctly, biosolids are safe. The EPA does not disclose the shortcomings of information used to assess safety, nor does it reveal that potentially harmful and unregulated pollutants are present in biosolids such as pharmaceuticals, steroids and flame retardants. EPA scientists working on biosolids told us that without completing risk assessments on all of the pollutants found in biosolids they cannot say whether biosolids are safe. Also, while the number of unregulated pollutants has expanded over time, the EPA has reduced its biosolids program."**

# Recent News Articles Reporting Farm Contamination by Biosolids PFAS

**VERMONT**

Sewage sludge spreading leads to farm groundwater PFAS contamination

By Elizabeth Gribkoff Posted. Apr 12 2020

**WISCONSIN**

**DNR: Tyco must provide drinking water to residents with PFAS contaminated wells**

Tuesday, April 14th 2020

**MASSACHUSETTS**

'Forever chemicals' are found in MWRA fertilizer, drawing alarm

By David Abel Globe Staff, December 1, 2019, 7:32 p.m.

**MICHIGAN**

The hunt for PFAS turns to Michigan farms using human waste as fertilizer

Posted Jun 19, 2019

Michigan is tiptoeing around PFAS in dairy agriculture

Updated Jul 30, 2019; Posted Jul 30, 2019

**MAINE**

TOXIC PFAS CHEMICALS FOUND IN MAINE FARMS FERTILIZED WITH SEWAGE SLUDGE

Sharon Lerner Posted June 7 2019

# State investigating ‘very startling’ levels of PFAS chemicals on central Maine dairy farm

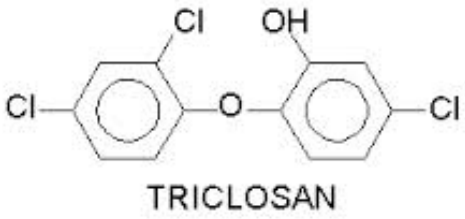
BY KEVIN MILLER PORTLAND PRESS HERALD JULY 29, 2020

**Milk from a Central Maine dairy farm contained levels of a harmful “forever chemical” that were 60 to 150 times higher than health standards, triggering a state investigation and raising new concerns about PFAS contamination on farms.**

State officials declined to identify the farm, but said Maine's milk supply remains safe because the farm was sending a relatively small amount of milk to a processor that was blending it with milk from other farms.

# Present-Day NY DEC and USEPA Rules for Toxins in Sewage Sludges

- **Only 9 (EPA) or 10 (DEC) heavy metals have sludge quality (ppm) and/or soil loading (lbs/acre) limits**
- **No synthetic (organic) chemicals (e.g., PFAS) are regulated**
- **Limits are based on an outdated 1993 risk assessment using inadequate data and non-cautious assumptions**
- **Present-day sludges commonly contain chemicals/toxic metals that are not regulated because earlier EPA research had not looked for or detected them**



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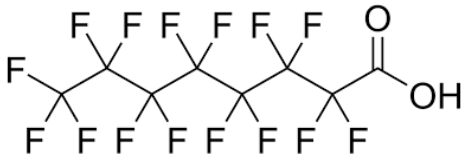


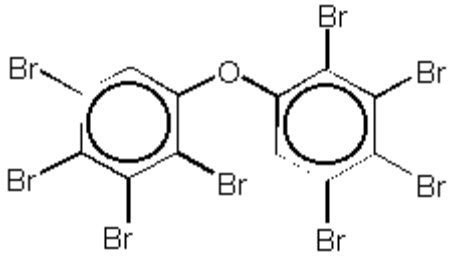

# Why Concern over Organic Chemical Pollutants Accumulating in Farm Soils ?

- Many are taken up by crops
- Many are bioaccumulative in livestock (e.g., dairy cows)
- Soil > livestock > human
- Many are persistent in soil (e.g., PFAS, fire retardants, dioxins microplastics)
- Many have suspected or known Human and Ecological Toxicity ( some carcinogenic, some endocrine-disrupting)
- Most are "invisible" (not generally or easily tested for)
- New unevaluated "emerging contaminants" continue to show up in sludges.
- Scientific understanding of behavior and toxicity is lagging far behind the application of these chemicals on farms

## My Conclusions about Sewage Sludge Application to Land

- **It is not reasonable to conclude from existing research that there is little or no risk of applying a material containing unknown concentrations of thousands of chemicals with undetermined toxicities to farmland.**
- **Quantitative risk assessment is probably impossible, given the chemical complexity and variability of sewage sludges.**

# Because: *The Case for Caution*

- Our ability to confidently predict risks from land application is very limited
  - Contaminants concentrate in sewage sludges
  - Many unevaluated, new contaminants in sludges

    (503 -only looks at indicator pathogens and 9 metals)
  - Present US standards are based on outdated risk assessment with many shortcomings
- Numerous anecdotal reports of illness
- If problems on farm, hard to prove cause
- Liability rests largely with the farmer
- Enforcement and monitoring are inadequate