Back Ground

It all started in 1972 with the passing of Marine Protection, Research and

Sanctuaries Act. It is the only pollution law that explicitly requires

consideration of land-based alternative disposal.

1972 was also the year that Congress passed the Clean Water Act, with major

revisions in 1977, 1981 and 1987. Last revisions, in 1987, resulted in amendments directing the EPA to research and promulgate the land applications of sewage sludge. A year later in 1988, Congress passed the Ocean Dumping Ban Act, thus eliminating all but land disposal method of sludge.

The Act went into effect in 1992, also the year when the Public Relation firm was hired by the sewage industry to devise a plan for gaining public acceptance of sewage sludge

land disposal. And so, the names “biosolids,” “industrial residuals,” “natural

fertilizer,” and “organic nutrients” were invented.

EPA quietly removed the sewage sludge from the list of HAZMAT and in 1993,

sewage sludge federal regulations were published in the Federal Register as

the “Part 503 rule,” promulgated under the authority on the Clean Water

Act, Title 40 of the Code of Federal Regulations, Part 503.

In 1986, Synagro Technologies Inc. was founded, a company currently operating in 34 states, specializing in agricultural disposal of sewage sludge and industrial waste. Or, to be politically correct, “biosolids and industrial residuals management.”

EPA REGULATIONS FAILURE

The Part 503 rule is a set of federal guidelines for the oversight and

monitoring of agricultural use of sludge. The science behind those rules is

grossly outdated, based on 1970 understanding of environmental sciences,

biology, toxicology and pathology.

The futility of these EPA guidelines to protect public health lays not only in the

fact that the regulations include a very narrow scope of pollutants required to

be monitored (just ten heavy metals and only two species of bacteria fecal coliform OR one species Salmonella of 2,300), but they also don’t reflect recent scientific findings. They regulate an infinitely small fraction of environmental pollutants, while ignoring a vast majority of dangerous components of sludge.

EPA regulations fail to incorporate existing scientific information and to

protect the public. While numerous scientific experts recommend total ban on

land application of sludge, U.S./ State EPAs and the so-called Big Sludge industry

continues to promote it. Sludge land application is a result of local and state

economics and political factors, rather than the environmental and public

health considerations. Sludge continues to be sold to the public as a “nutrient

–rich garden compost” and advertised to farmers as beneficial, nutrient rich and a valuable fertilizer that is “safe” for the environment. You will find numerous false statements of “safe” in 503. Examples below this brief.

A total ban of agricultural use of sludge is only a partial solution as the alternatives such as landfill or incineration are also hazardous.

To ensure the true protection of the environment and public health would

require the EPA to reformulate the problem, to implement new federal

regulations based on the most current science.

However, EPA along with other federal, state and private institutions, such as

USDA, universities and waste management companies (most prominently –

Synagro) - continues to obstruct an unbiased, independent research and this

in turn undermines an objective risk assessment and regulation.

ENVIRONMENT AND PUBLIC HEALTH RISKS

Targeted National Sewage Sludge Survey Sampling and Analysis Technical

Report, published in 2009 by EPA lists max an min levels of heavy metals,

pharmaceuticals, organic chemicals, steroids and hormones that were found

in sludge samples tested. High levels were found in all pollutant categories,

for example – flame retardants and antibiotics. The survey included only a

small subset of the toxic chemicals in use in the country.

Tens of thousands of organic chemicals are in use in USA, but a sludge

concentration of only 516 organic chemicals has been so far researched. The

data is lacking on fate and toxicity of chemicals to human and non-human

receptors. An accurate assessment of a degree of the risk posed by the sludge

is not possible at this moment. It is however, abundantly clear from the

research available, that the EPA risk assessment is geared towards the

underestimation of those risks. Science–based precautionary approach to

investigating and identifying the toxic content of sludge should be the guiding

principle of EPA federal regulatory review.

The complexity of the ecological interactions in sludge applied soils makes it

exceedingly difficult for a definitive risk assessment. There are just so many

interactions, unknowns and uncertainties, that the application of sludge to the

land environment simply can’t be considered “safe” or free from risk. Accurate risk assessment

would require an in-depth understanding of a long and short-time effects of

sludge on soil microbial community, plant life and wildlife. And then there is

the issue of public health risks. There is a great need for better understanding

of a build-up of the toxins and contaminants over time with multiple

applications and their movement from land environment into the

groundwater, lakes, rivers and oceans. Long term, multidisciplinary,

comprehensive research programs are needed to gain an understanding of the

impact this practice has on the environment and human population.

New chemicals are invented almost daily. EPA formulated the 503 rule

guidelines well before many of them were even conceived. (See the US EPA Toxic Substance control Inventory of 86,000 listed chemicals)

<https://www.epa.gov/tsca-inventory/about-tsca-chemical-substance-inventory>

Let’s look at nanosilver, which is a biocide (EPA definition: "a diverse group of

poisonous substances including preservatives, insecticides, disinfectants, and

pesticides used for the control of organisms that are harmful to human or

animal health or that cause damage to natural or manufactured products").

Nanosilver is a component of anti-microbial formulations in textiles, food

packaging and medical devices. Coleman et al in 2013 published an article:

“Low concentration of Silver Nanoparticles in Biosolids Cause Adverse

Ecosystem Responses Under Realistic Field Scenario”. In this article the

author argues that nanosilver applied at realistic levels to the soil by the

biosolids route adversely affects plants and soil microbes.

Another example; a group of persistent, bioaccumulative, toxic compounds

known to exist in the sludge in high concentration: brominated flame

retardants. A subclass of those – polybrominated diphenyl ethers (PBDEs) –

there is 208 different PBDEs, each of them has unique toxicology and

environmental fate. This group of chemicals has been studied extensively for

decades and still today we have a rather poor understanding of the true risks

associated with it’s release to the environment.

And that’s just one group of contaminants among so many. Add another 210

chlorinated dioxins (we are still talking about only flame retardants) and you

maybe begin to grasp the extend of the total amount of known and unknown

contaminants that end up in the sludge. They are concentrated thousands

folds during the treatment process and then released to the landscape.

Marine biochemist, Robert Hale from Virginia Institute of Marine Sciences, in

his 2004 publication: “Organic Contaminants of Emerging Concern in Land

Applied Sewage Sludge” concludes that contaminants not even considered by

the authors of rule 503 EPA regulations are indeed present in all of the

biosolids samples examined during this study and he strongly suggests

reevaluation of those guidelines in the light of those findings. Not only the

“historically” tracked contaminants like heavy metals, petroleum products,

pesticides and PCB were present in those samples, but also chemicals that

were never evaluated before as a potentially present in the sludge;

polybrominated diphynyl ethers, triclosan and polycyclic musks. Those are

contaminants of yet undetermined level of toxicity to humans, wildlife and

microbial soil community.

There is little doubt that there are direct human health consequences of land

application of sludge. Several published public health reports clearly link the

sludge application sites to the overall decline of health by the surrounding

communities.

Czajkowski et al in a publication from 2010 “Application of GIS in Evaluating

the Potential Impacts of Land application of Biosolids on Human Health”

concludes that there is a statistically significant increase in ill-health

symptoms and diseases near the biosolids permitted fields.

Exposed residents were defined as those living within the one mile radius of

filed applied biosolids, the illnesses included certain respiratory,

gastrointestinal and other diseases.

Jordan Peccia, one of the most prominent scientific minds in environmental

toxicology, a professor at Yale University, published several articles

addressing risks associated with biosolids agricultural use. In 2007 he coauthored

a study “Source Tracking Aerosols Released from Land-Applied

Class B Biosolids During High-Wind Events”. In that publication he concluded

that during windy days over 60% of air samples taken downwind from the

biosolids applied field contained DNA fingerprint of bacteria commonly

present in sludge. What bacteria, you might ask? A pathogen or a benign

microbes common everywhere around us? Dr Peccia tackled that question in

2010 publication titled “Pyrosequencing of the 16SrRNA gene to Reveal

Bacterial Pathogen Diversity in Biosolids”. In this article he concluded that

most species identified were opportunistic pathogens from the group

Clostridium and Mycobacterium. Those are NOT the two species of bacteria

the EPA rule 503 regulations that are required to monitored, yet as proven

in this study – represent the majority of the bacterial pathogen load in

biosolids.

In a Master’s Degree dissertation – “Bioaerosols Generated from Biosolids

Applied Farm Fields” a graduate student from Ohio Tech established that

pathogenically non-treated class B biosolids are capable of generating

potential pathogens in the air. He observed that the level of bacterial

pathogens significantly increased in the air samples following the biosolids

application with the highest level reached at day 13 post application. That in

turn correlates with the increase of health problems reported by the residents

of a nearby community.

There are many other published reports corroborating those findings, but

more epidemiological data is needed. EPA should be at the forefront of

promoting and subsidizing such studies, instead it turns the blind eye on a

growing body of evidence and instead promotes research sponsored by the

sludge industry.

Another area of great concern associated with the biosolids production is the

emergence of antibiotic-resistant pathogens. The evolution of multidrug

resistant bacteria is and acknowledged international health crisis. Major

sources of those bacterial strains are water treatment plants and CAFO

facilities.

Wastewater treatment plants concentrate sludge and present in it; both –

bacterial pathogens from numerous sources and antibiotics, thus creating a

perfect storm scenario for the emergence of antibiotic resistant strains by the

means of horizontal gene transfer of antibiotic resistance genes.

CONCLUSIONS

Current federal and state regulations clearly don’t protect the environment or

public health from the consequences of the agricultural sludge application.

The full scope of that impact is not even fully known, as the independent,

objective research is being discouraged at best, and most often squelched by

the powerful forces of biosolids industry.

It is evident that the long-term exposure to a host of the environmental

pollutants is the foundation of many chronic conditions that are now at the

epidemic levels. Rather than focusing narrowly on determination of specific

sets of toxins present in biosolids from different sources – the research needs

to shift to the epidemiological studies assessing the overall impact of complex

mix of pollutants present in sludge.

It is true that biosolids contain beneficial elements like phosphorus, nitrogen,

organic matter and trace nutrients. But the benefits derived from introducing

those components to the soil via biosolids are by far overshadowed by the

detrimental effects of toxins and pollutants that comprise the vast majority of

the biosolids content.

Samples of 503 statement:

***“Restrictions on Crop Production***

*Food, feed, or fiber crops may not be grown on an active biosolids unit*

*unless the owner or operator of the surface disposal site can demonstrate to*

*the permitting authority that through management practices public health*

*and the environment are protected from any reasonably anticipated adverse*

*effects of certain pollutants that may be present in biosolids. If the*

*owner/operator wishes to grow crops on the site, he or she must obtain a*

*permit that requires the implementation of certain management practices to*

*ensure that the levels of pollutants taken up by crops do not negatively*

*affect the food chain in regard to animals or humans.*

*These special management practices might include testing crops and 503*

*animal tissue for the presence of pollutants if animal feed is produced on*

*the site, or setting a monitoring schedule for the crops and any animal feed*

*products derived from crops grown on the site.*

***Restrictions on Grazing***

*Animals must not be grazed on an active biosolids unit unless the*

*owner/operator of a surface disposal site can demonstrate to the permitting*

*authority that public health and the environment are protected from any*

*reasonably anticipated adverse effects of certain pollutants that may be*

*present in biosolids. If the owner/operator wishes to graze animals on the*

*site, he or she must obtain a permit. The permit could require specified*

*management practices, such as monitoring the concentration of pollutants in any animal product (dairy or meat). This restriction on grazing* ***helps ensure that unsafe levels of pollutants do not find their way into animals from which people obtain food.”***

**PFAS is an example of EPA regulatory failure. PFAS has been used since the 50s.**

Page 56 of the Plain English Guide to 503

*“QUESTION: Does EPA believe there is an environmental or public health*

*problem related to the beneficial use of biosolids in accordance*

*with the Part 503 rule:*

*ANSWER: It is EPA’s long-standing position that the beneficial application of*

*biosolids to provide crop nutrients or to condition the soil* ***is not only***

***safe but good public policy****, so long as preparers and land appliers comply*

*with all applicable requirements of the Part 503 rule. Among other things,*

*those requirements address the quality of biosolids allowed for land*

*application, the rates of application of biosolids under various*

*circumstances, and monitoring. Beneficial use of biosolids reclaims a*

*wastewater residual, converting it into a resource that is recycled to land.*

*EPA’s position on biosolids use is based on extensive research involving*

*hundreds of successful land application projects over the past 25 years.”*

*“Risk Assessment Basis of the Part 503 Rule*

*Many of the requirements of the Part 503 rule are based on the results of an*

*extensive multimedia risk assessment. This risk assessment was more*

*comprehensive than for any previous Federal biosolids rulemaking effort*

*the earliest of which began in the mid-1970s. Research results and*

*operating experience over the past 25 years have greatly expanded EPA’s*

*understanding of the risks and benefits of using or disposing of biosolids.*

*Development of the Part 503 rule began in 1984. During this extensive*

*effort, EPA addressed* ***25 pollutants*** *using 14 exposure pathways in the risk*

*assessment. In this assessment, EPA also* ***developed a new methodology***

***that provided for the protection of the environment and public health****. The*

*new method for conducting the multimedia risk assessment was reviewed*

*and approved by EPA’s Science Advisory Board”*

503 land application a risk guide is in the benefits document.