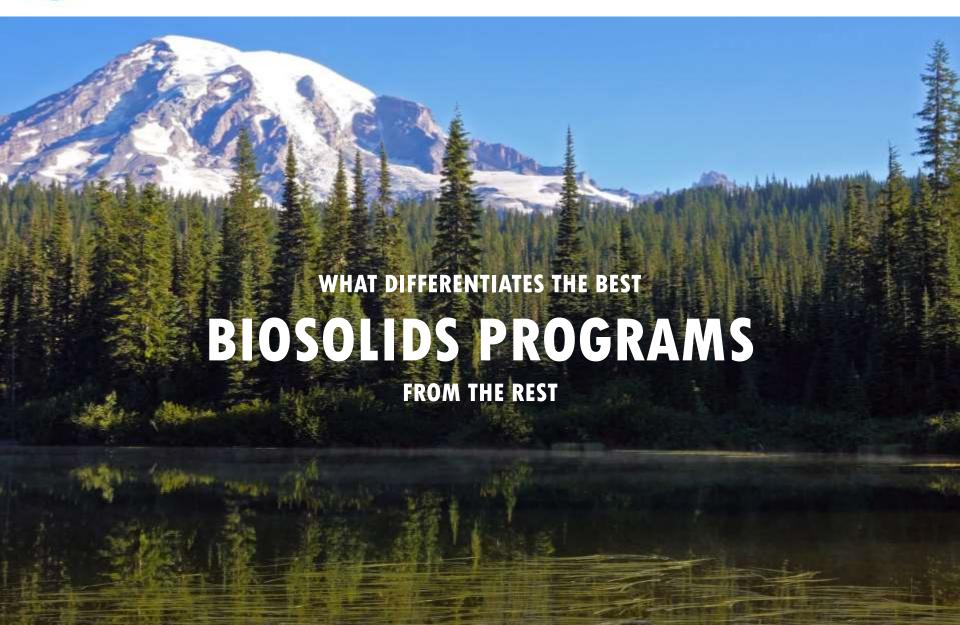


Karri Ving

Resource Recovery And Pollution Prevention Manager
Wastewater Enterprise





PURPOSE OF TRIP

- Better understand successful biosolids program
- Learn from successes in the Pacific Northwest
- Bring back lessons learned to Northern California



Dr. Sally Brown conducts biosolids field trials on mustard plants in Washington

Two Major Outlets Carry Risk

Land Application

- Subject to County Supervisor whim and good or bad behavior of hauling and application contractors
- No relationship with farmers, no way of knowing what benefit biosolids provide
 - Agronomic rates; no quantification of benefits

ADC At Landfills

- Current competition for landfill capacity coupled with eventual phasing out of ADC by 2025 at the latest
- No other viable options, should a current option be threatened or go away.



KING COUNTY, WASHINGTON

Similarities

- Mostly Class B with 5% Compost
- Land app as far as 250 miles round trip

Differences

- 30-year partnership with academia
- King County emphasis on marketing
- Compost comes back into Seattle for community gardening and PR
- Eight 50-acre research plots
- Multiple farms requesting biosolids

Nine dedicated biosolids staff

- One a proactive spokesperson
- Got rid of middle man/broker
 - Relationships directly with farmers

Lessons

Learned

Observations

- Components of a low-risk program:
 - Dedicated staff
 - Direct relationships with end users
 - Academic partnerships

...not as easy as just slapping on a label







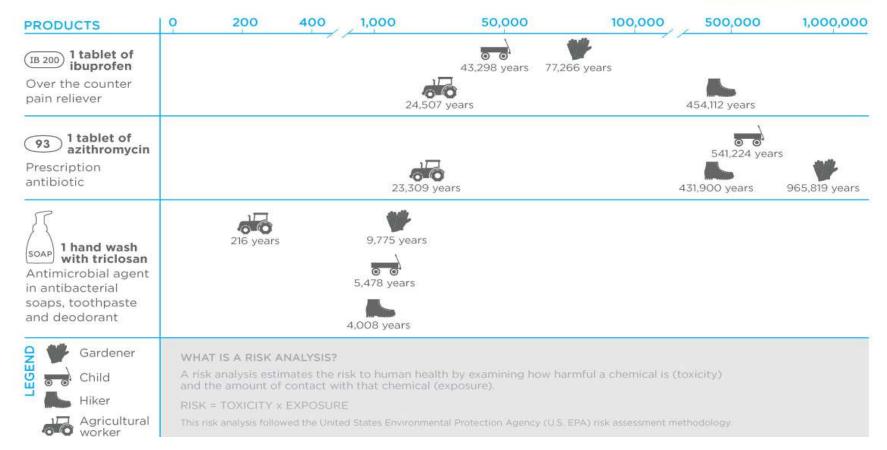
KING COUNTY, WASHINGTON



Working or playing around biosolids or compost made with biosolids poses very little risk, much less than everyday exposure to common products.

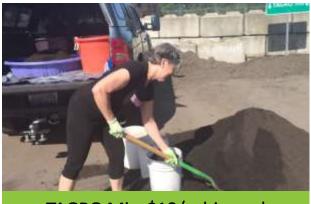
Number of YEARS of contact with biosolids or compost made with biosolids required to reach the equivalent of one dose or exposure to common products.







- Program Costs: \$25/ton
- Public significantly values low cost soil amendments made locally
- Over 100 blue ribbons won from local fairs
- Exclusion from Organic label not an issue with potting and topsoil products
- Refusal to give TAGRO mixes to Rec & Park because they wouldn't pay for it
- TAGRO staff looked at SF's ADC practices as "burying money"
- Tacoma also funded academic research
 - Over the years, TAGRO users have become the experts



TAGRO Mix: \$10/cubic yard **50% Class A, 25% Sawdust, 25% Sand**



TAGRO Top Soil - \$23/cubic yard 60% Mix, 40% Tree Bark



TAGRO Potting Soil: \$30/cubic yard **20% Class A, 20% Sawdust, 60% Tree Bark**





SFPUC

- Biosolids disposition addressed through contractors
 - Lately, contractors' trucks turned away by farms and landfills
 - No stability or control over fate
 - No relationship with users
 - Users have no vested interest in program
- Past compost giveaways were extremely successful...
 - But PUC lacked relationships
 with creditable experts that test
 biosolids and amended soils

Tacoma TAGRO

- Everything done in-house: complete vertical integration
 - Product delivered by city staff
 - Drivers serve as ambassadors
- Household name: 60% usage
 - Ratepayers pay for program, then buy the resulting products
 - "Like selling ice to an Eskimo"
 - Product associated with flowers and water, not sewage
- Fully utilized their biosolids this year and soil blend market now exceeds biosolids supply

DC WATER



Existing Programs

- Starting point was evaluating existing Class A biosolids blending programs
- · 3 Existing facilities in North America
 - TAGRO Tacoma, WA
 - Vancouver and Abbottsford, British Columbia
- Visited sites, studied blend formulations, tested products
- Evaluated marketing strategies, too

Of course, there will be regional differences in acceptability of "bia-soils"





Residuals and Biosolids





Product Comparison

PRODUCT	pН	Electrical Conductivity	Total N	Organic N	Nitrate N	Ammonia	
Fresh 8.5		3.8 dS/m	1.5%	1.4%	0.68%	1,200 ppm	
Cured	6.27	4.9 dS/m	1.3%	1.2%	0.82%	240 ppm	

PRODUCT	Moisture Content	Organic Matter	Bulk Density	Stability	Maturity
Fresh	68.9%	60.8%	51 lbs/ft3	7.0 mg CO ₂ -C/g OM/day	100/61
Cured	67.7	53.1	55 lbs/ft3	1.9 mg CO ₂ -C/g OM/day	100/94%

- Still learning about product, more work underway
- Moving towards creating a aging / curing / weathering facility to make a more versatile product
- Minimal change in moisture content because curing was done out of doors (rain)

Residuals and Biosolid

NORTHWEST BIOSOLIDS MANAGEMENT ASSOCIATION AND UNIVERSITY OF WASHINGTON

- 1 Why Partner with Academia?
 - Biosolids agencies lack credibility.
 - Development of irrefutable talking points
 - Possess a total command of literature—accessible and comprehensive
 - Relationships with professors create a pipeline for staff recruitment
- 2 How Do We Partner with Academia?
 - Offer internships with a lab or research component to grad students. You'll have access to their professors
 - Information exchange with consortiums like ReNUWIt

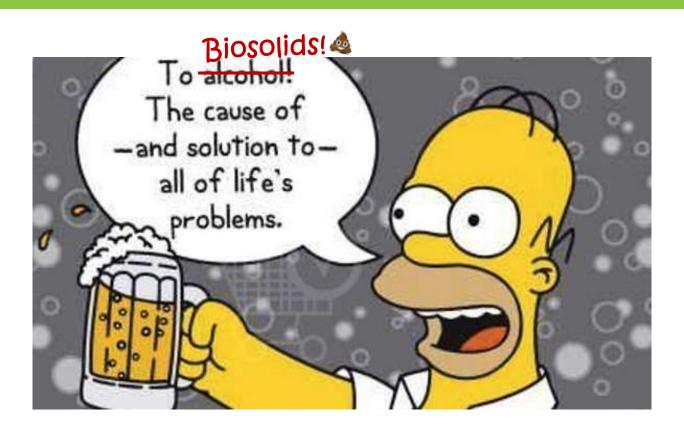








BASED ON THIS INFORMATION, HOW SHOULD WE PERCEIVE OUR CURRENT BIOSOLIDS PROGRAM AND ARE THERE OPPORTUNITIES FOR IMPROVEMENT?



How to Incorporate these Lessons

Have a plan

- Where are we going?
- How will we get there?

Partner with Academia

- Understand our biosolids better
- How do we know enough about and address public concerns with biosolids?

Foster Familiarity

• Develop programs and tools that foster biosolids familiarity and convey important messages

End Users

• Develop our own relationships with end users of our products

Develop Staff

• Hire or internally groom key staff to play proactive roles in biosolids management



2 PARTNER WITH ACADEMIA

We Need to Better Understand:

A. Safety and Public Perception

- "Anything we don't know, we assume the worst"
- How do we know enough about and address any public concerns with biosolids?
- Presence of trace compounds does not equal harm
- Have third party spokespeople/experts on hand to address public inquiries

B. Product Performance of Biosolids in Soil

- What do biosolids do to soil and how can we quantify?
 - Water holding capacity
 - Organic matter
 - Carbon sequestration



Gabrielle Pecora

PhD Student at UC Davis Sonoma, California | Environmental Services

rrent UC Davis, Lawrence Berkeley National

Laboratory

Carbon Cycle Institute, Biotech Energy of America, Dominican University of California

Education University of California, Davis



Gary Andersen

Microbial Ecologist

Ecology Department Head

Senior Scientist





Professor Thomas Young

<u>Civil and Environmental Engineering</u>

University of California

Davis, CA 95616



WERF Research on Treatment and Management of Residuals and Biosolids

Highlights:

- Almost one-third of WERF's research presearch is valued at well over \$20 milli
- Research continues in almost half of WE Operations Optimization, with more und Biosolids). Some of this work has been cooperative agreement between WERF
- The <u>Biosolids TCR</u> (Targeted Collaborat identified in the WERF-EPA Biosolids Res Subscribers, each contributing <u>betwee</u> Organics in Biosolids challenge.
- WERF is actively seeking funding part

SRSK5T09

TRACE ORGANIC CHEMICALS IN BIOSOLIDS-AMENDED SOILS

STATE-OF-THE-SCIENCE REVIEW

by

Christopher P. Higgins Jonathan O. Sharp Jennifer G. Sepulyado TECHNICAL BRIEF:
TRACE ORGANIC COMPOUNDS
AND IMPLICATIONS FOR
WASTEWATER TREATMENT

CEC3R07

by

Paul D. Anderson, Ph.D. AMEC Earth and Environmental, Inc.

2008

Risks Associated with Application of Municipal Biosolids to Agricultural Lands in a Canadian Context

Literature Review

March. 2015

Hormones, sterols, and fecal indicator bacteria in groundwater, soil, and subsurface drainage following a high single application of municipal biosolids to a field

N. Gottschall^a, E. Topp^b, M. Edwards^a, M. Payne^c, S. Kleywegt ^d, P. Russell^a, D.R. Lapen^a.*

- * Agriculture and Agri-Food Canada, Ottowa, ON, Canada KIA 006
- Agriculture and Aget-Food Canada, London, ON, Canada NSV 473
 Ontario Ministry of Agriculture, Food and Rural Affain, Straiford, ON, Canada NSA 578
- Contains Ministry of Agriculture, Food and Rural Affains, Straighrd, ON, C Contains Ministry of the Environment, Toronto, ON, Canada M4V 1M2

HIGHLIGHTS

- Single high rate land application of dewatered biosolids not high risk for hormone and sterol contamination in water.
- ▶ Limited detection of steroidal hormones and fecal sterois in subsurface drainage.
- ▶ No detection of steroidal hormones in groundwater.
- ▶ Fecal sterol natios useful for tracking transport of biosolid-borne contaminants in tile drainage and soil.

NEW ITEMS IN THE NBMA RESOURCE LIBRARY

PPCPs research by Dr. Wu

December 2012



TITLE: Dissipation and leaching potential of selected pharmaceutically active compounds in soils amended with biosolids

Author: Wu, C., A. L. Spongberg, J.D. Witter, M. Fang, K.P. Czajkowski, and A. Ames

Source: Arch. Environ. Contam. Toxicol. 2010 59:343-51

Abstract: Biosolids land application is an important pathway introducing pharmaceuticals into the environment. In this work, laboratory column and dissipation experiments were performed using soils of varying properties in order to study the fate and transport of pharmaceutical residues introduced by the land application of biosolids. For experimentation, five pharmaceutical compounds (carbamazepine, diphenhydramine, fluoxetine, diltiazem, and clindamycin) and two metabolites (carbamazepine-10,11-epoxide and norfluoxetine) commonly found in biosolids were selected. Leaching experiments indicate that the selected pharmaceuticals have low

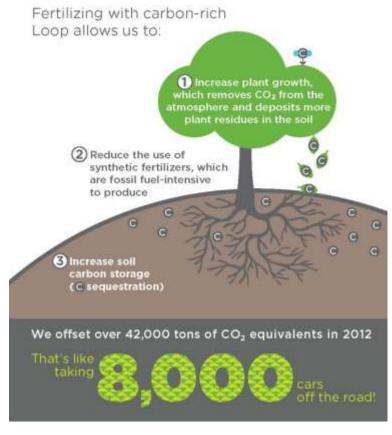
3 FOSTER LOCAL FAMILIARITY

Develop Communication Pieces and Public Outreach Tools

 Using data sourced from academic and peer reviewed research







3 FOSTER LOCAL FAMILIARITY

Develop Programs and Opportunities to Showcase Biosolids

- Conduct a biosolids demonstration at the SFPUC Garden at 7th and Lawton
- With academic, CASA, and EPA partnerships, initiate a brownfield remediation demonstration within SF
- Potential participation in field trials in Marin County, San Mateo County, and at FSSD







1 HAVE A PLAN: BIOSOLIDS TRANSITION STRATEGY

Can't slap a label on it—it's not that simple

Biosolids Transition Strategy

Develop a biosolids end use transition strategy to address shortcomings in the current biosolids management program. The strategy will address three key areas in the biosolids program:

- Optimization of Current Program: Assess available options for management of the SFPUC's Class B biosolids. This assessment will include a business case evaluation (BCE) of winter biosolids storage. Identify any institutional or other barriers to management plan optimization.
- 2) Optimization of End Use of OSP Class A Biosolids: Identify activities necessary to explore new market uses for the anticipated Class A product from the OSP. This will include an assessment of the Solano County biosolids ordinance and its applicability to the new product. Identification of an implementation plan for demonstration of soil blending with the Class A product will also be included in this task.
- 3) Identification of Critical Path Activities for Use of Class A THP Product: The SEP will generate a Class A THP product upon completion of design and construction of new solids handling facilities. Activities associated with expanded use of this product will be identified (e.g. research needs, market research/sounding, and identification of potential barriers to implementation).

Components:

- · Technical memorandum detailing optimization of the current program
- Business Case for winter storage associated with the current end use program
- Technical memorandum detailing efforts required to expand use of Class A products at the OSP and SEP.
- . Timeline of critical path activities for use of Class A THP product
- Power Point slides for two workshops/meetings

QUESTIONS?

Karri Ving

Resource Recovery And Pollution Prevention Manager
Wastewater Enterprise
SFPUC
kving@sfwater.org



