State of Wisconsin
Land and Water Conservation Board

PO Box 8911
Madison, WI 53708-8911
608-224-4622

Land and Water Conservation Board
Forum on
Land-Applied Wastes from Municipal, Septic, and Industrial Sources

August 2, 2011
1:00 p.m. -- 4:30 p.m.

Boardroom 106
Wisconsin Department of Agriculture, Trade and Consumer Protection
2811 Agriculture Drive
Madison, WI

Agenda

THE LWCB MAY TAKE ACTION ON ANY OF THE ITEMS LISTED ON THE AGENDA AT THE SCHEDULED FORUM

1:00 p.m.	1	Call to order—Mark Cupp, LWCB Chair a. Open meeting notice b. Approval of agenda c. Introductions d. Purpose of forum
1:10 p.m.	2	"Sludge 101," the current state of regulating land-applied liquid wastes—Fred Hegeman, DNR
2:10 p.m.	3	Sludge and agriculture--how (and whether) nutrient management planning takes sludge applications into consideration—Todd Schaumberg, Polenske Agronomics Consulting; and Bill Hafs, Brown County Land and Water Conservation Department.
2:55 p.m.		Break
3:00 p.m.	4	Land-applied sludge and its environmental and human health impacts —Mark Borchardt, USDA Agricultural Research Service
3:45 p.m.	5	Public comment
4:15 p.m.	6	Forum wrap up
4:30 p.m.		Adjourn

Mark Cupp, Chair • Tom Rudolph, Vice-Chair • Dennis Caneff, Secretary
Members: Sandi Cihlar • Robin Leary • Charles Wagner • Patrick Laughrin • Ryan J. Schroeder
Jana Steinmetz • John Petty • Ken Johnson

“SLUDGE 101”

“The current state of regulating land-applied liquid wastes”

Land & Water Conservation Board

August 2011

Frederick J. Hegeman, P.E.

Statewide Residuals Coordinator, WDNR

HISTORY
&
DEFINITIONS

HISTORY

- Clean Water Act (1972)
- Symbolic Goal of eliminating high amounts of toxic substances
  - Eliminating additional water pollution by 1985
  - Ensuring that surface waters would meet standards necessary for human sports and recreation by 1983
- WPDES Permit Requirements
  - Solid Waste Regulations (by-products)
  - Industrial Wastewater
  - Municipal and Industrial Sludges as Solid Waste
  - 40 CFR 257

HISTORY

NR 214 (Industrial Wastes)

- Industrial Wastewater – part of Wastewater
- Sludges, By-product Solids – part of Solid Waste
- Can be Land Applied **IF NOT HARMFUL**

NR 113 (Septage)

- Health Based Code

OCEAN DUMPING

- High nitrogen and phosphorous creating eutrophication and hypoxic zones
- Beach closures
- Shell fish bed closures
- Negative economic impact on fisheries and beaches
- Toxic compounds were ending up in ocean sediment.
- Ocean Dumping Ban of 1988

HISTORY

Clean Water Act Amendments of 1987

- 40 CFR 503 (1987)
- First Risk Based Federal Code
- 14 Exposure Pathways
- Metals & Toxics
- Pathogen Control & Vector Attraction Reduction
- Septage vs Biosolids
- Tracking vs. Planning
  - Communication
  - Limits
- Options: Landfill, Surface Cells, Incineration, Beneficial Re-use as Land Application (Fertilizer)

HISTORY

Options from 1987 Clean Water Act Amendments:

- Landfill,
- Surface Cells,
- Incineration,
- Beneficial Re-use as Land Application (Fertilizer)

RESULTED

- NR 214
- NR 204
  - Municipal Sludges
  - Treatment, Stabilization, Monitoring
  - Pathogen Control
  - Vector Attraction Reduction
- NR 113
  - Pathogen Control
  - Vector Attraction Reduction

DNR LAND APPLIC CODES

- NR 113: SEPTAGE
- NR 204: DOMESTIC SEWAGE SLUDGE MANAGEMENT
- NR 214: LAND TREATMENT OF INDUSTRIAL LIQUID WASTES, BY−PRODUCT SOLIDS AND SLUDGES
- NR 518: Land Application of By-Product Solid Wastes
- NR 243: CAFOs
- NR 151: Run Off Management
- Requires “harvesting of crops”

DEFINITIONS

"Septage" means the wastewater or contents of septic or holding tanks, dosing chambers, grease interceptors, seepage beds, seepage pits, seepage trenches, privies or portable restrooms. (NR 113)

DEFINITIONS

"Sewage sludge" or "sludge" or "biosolids" means the solid, semi−solid or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes scum or solids removed in primary, secondary or advanced wastewater treatment processes and material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works. (NR 204)

DEFINITIONS

"Liquid waste" means process wastewater and waste liquid products, including silage leachate, whey, whey permeate, whey filtrate, contact cooling water, cooling or boiler water containing water treatment additives, and wash water generated in industrial, commercial and agricultural operations which result in a point source discharge to a land treatment system. (NR 214)

DEFINITIONS

- “Biosolids” are the nutrient-rich organic materials resulting from the treatment of sewage sludge. (EPA)

DEFINITIONS

"By−product solids" means waste materials from the animal product or food processing industry including, but not limitedto: remains of butchered animals, paunch manure and vegetable waste materials such as leaves, cuttings, peelings and actively fermenting sweet corn silage. (NR 214)

DEFINITIONS

"Sludge" means the accumulated solids generated during the biological, physical or chemical treatment, coagulation or sedimentation of water or wastewater. (NR 214)

LAND APPLICATION GENERAL INFORMATION

ACRES USED 2009

- Harvested Cropland Acres-8.8 Mil Acres (USDA)
- Septage
  - 80,000 Acres est. used in any given year
  - 0.90% of Harvested Cropland
- Biosolids (~61,000 met tons)
  - 70,000 Acres est. used in any given year
  - 0.79% of Harvested Cropland
- Industrial Wastewater/Sludge Applic
  - 1,146,400 Acres est. used in any given year
  - 3.87% of Harvested Cropland

SEPTAGE

SEPTAGE

- Pathogen Control
  - Limitations between last application and Crop to be Harvested
    - Public Access
    - Below ground crops
    - Touch surface crops
    - Not likely to touch surface crops
    - Animal Feed Crops
    - Turf or Sod
  - Differences if pH to 12 or applied without pH
    - Environmental Protection (i.e., sunlight, exposure to elements)

SEPTAGE

- Vector Attraction Reduction
  - Injection
    - No ponding
    - Nitrogen Availability
  - Incorporation
    - 6 hours
    - Nitrogen Availability
  - pH Control (lime)
    - pH 12 for 30 minutes
    - Significant Record Keeping
    - Test Each Batch (Truckload)

SEPTAGE

- Application Rates
  - 13,000 gal/acre/week (0.5” of water)
  - 39,000 gal/acre/year (1.5” of water)
    - 100# of nitrogen (EPA formula)
- Factor of Safety
  - Septage vs. Biosolids
  - Testing each batch
  - Variability
  - Nitrogen—approx 40% of actual
    - Nitrate concerns
  - Phosphorus—EPA (1982) estimates

SEPTAGE

- Business Licenses (no WPDES permit)
- Site Approvals
- Daily Logs
  - Service Location
  - Disposal
  - Vector Attraction Reduction records
- No Commercial Septage (by WPDES Permit only)
- Annual Reports

BIOSOLIDS

(TREATED MUNICIPAL SLUDGES)

BIOSOLIDS

3 General Criteria

- Metals
- Pathogen Control
- Vector Attraction Reduction

BIOSOLIDS

3 Typical Classes of Biosolids

1. Exceptional Quality (“Class A”)
2. Commonly known as “Class B” Biosolids
3. Non-Land Applicable Biosolids

   --LAND FILL or INCINERATE

BIOSOLIDS

METALS (and other) TESTING

- Arsenic, Cadmium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Zinc
- PCB
- Radium 226 (For Select Facilities)
- Priority Pollutant Scan (Once per permit term if deemed necessary)
- Nutrients: N as nitrites and TKN, P and WEP, K,
- % Solids, etc

BIOSOLIDS

PATHGEN CONTROL

- Class A vs Class B
  - A: Fecal Coliform: MPN / gram: Limit 1000 or
  - A: Salmonella: MPN / 4 gram: Limit 3
  - B: Fecal Coliform: MPN / gram: Limit 2,000,000
- Must be a Process
- Class A requires Add'l Process to "further reduce"

BIOSOLIDS

VECTOR ATTRACTION REDUCTION

- 11 options: 9 Treatment / 2 Barrier
- 3 Most Common (POTW numbers)
  - 38% Volatile Solids Reduction
  - Incorporation
  - Injection

BIOSOLIDS

- Exceptional Quality (EQ) Product
  - Approx 10 facilities 3 yrs ago
  - Approx 18 facilities currently
  - Most Well Known:
    - MILORGANITE
  - Others
    - Madison Met
    - Lakeland (Minocqua)
    - West Central Regional Biosolids Facility

BIOSOLIDS

- NUTRIENT APPLICATION
  - Tested and applied at appropriate rates (Nitrogen-EPA Required)
    - Mineralized—25%, 12%, 6% Rates
  - Phosphorus higher
    - Requires 3 to 4 year rotations
    - Differences in available phosphorus
      - Biological Removal
      - Ferric Removal (iron salts)
      - Alum Removal (aluminum)

BIOSOLIDS

- WPDES Permit
- Site Approvals (Not EQ)
- Testing & Monitoring
  - Annual/Lifetime Loadings of Metals
  - Soil Nutrient Testing requirement
  - Nitrogen Monitoring
- Daily Logs for Land Application (Not EQ)
  - Disposal
  - Vector Attraction Reduction records
- Annual Reports (Limited for EQ)

INDUSTRIAL WASTE LAND APPLICATION

INDUSTRIAL WASTES

LAND TREATMENT SYSTEMS

- Absorption pond systems.
- Ridge and furrow systems.
- Spray irrigation systems.
- Overland flow systems.
- Subsurface absorption systems.
- Landspreading systems for liquid wastes and by−product solids.
- Sludge spreading systems.

INDUSTRIAL WASTES

- Can NOT Harm!
- Examples
  - Food Processing Wastes
  - Paper Mill Wastes
  - Cannery Waste
  - Dairy Wastes (whey)
  - Washwaters
  - Paunch Manure

INDUSTRIAL WASTES

- Typically NO Pathogen Control (exception of Paunch Manure)
- Nitrogen Loading
- WPDES Permit
- Site Approvals
- Management Plans
- Daily Logs
- Annual Reports

INDUSTRIAL WASTES

- WPDES Permit
- Site Approvals
- Testing and Monitoring
  - Nutrients & Chlorides
- Management Plan
- Daily Logs
- Annual Reports

SITE APPROVALS

-Septage

-POTWs (WPDES)

-Industrial (WPDES)

SITE APPROVALS

- Public Wells
  - 1000 ft (S, M, I)
- Private Wells
  - 250 ft (S, M, I)
- Residence
  - 500 ft but reduced pending permission from neighbors or method (incorporation/injection)

SITE APPROVALS

- Groundwater
  - 3 ft (S, M, I- Can be reduced to 18” for I)
- Bedrock
  - 3 ft (S, M, I)
- Slope Issues
  - 0-6%
  - 6-12%
- Property Boundaries (S, M)’
- Others

OTHER CODES

ATCP 50:

- ATCP 50.04 Nutrient Management
  - Requires all nutrients that are applied through mechanical means to be included into a nutrient management plan
  - Exemption: Primary nutrients from:
    - NR113, NR 204 and/or NR 214
  - Interpreted to mean that exempted during the year applied—NOT over ROTATION!

OTHER CODES

NR 151

Nutrient Management:

- All nutrients (even pastures up to 8 animals)
- Exemption for NR 113, NR 204 and NR 214 Wastes on a year basis
  - NOT on a rotation basis

STORAGE ISSUES

- NR 204 Storage: 180 Day Storage Mandatory
  - Structure regulated NR 110 / NR 204
- NR 113 Storage:
  - Difficult to obtain and Expensive
- NR 214 Storage
  - Few Contractors
  - Prefer to Commingle
    - Multiple Codes, WPDES facilities
- Mix into Manure Pits

MANURE PIT

- SEPTIC TANK WASTE
  - Threshold
    - Up to 10% Septage of contents in pit
    - Up to 25,000 gallons
  - Under
    - “Approved Pit”—Registered with DNR
    - Include on Annual Report
    - “Bulking Purposes”
  - Over
    - NR 213
    - All material must be applied as though it were “Septage”
      - Reporting, VAR, PC, Records, Etc

MANURE PIT

- INDUSTRIAL WASTES
  - Threshold
    - Up to 10% Septage of pit volume but no more than 10% mixture when land applied
  - Under
    - “Approved Pit”—Registered with DNR
    - NRCS 313 Construction
    - Include on Annual Report
    - NEW FORM 3400-196
      - Requires County Notification
    - “Bulking Purposes”
    - Nutrient Management Reporting
  - Over
    - NR 213
      - Reporting, VAR, PC, Records, Etc
    - Nutrient Management Reporting
    - NEW FORM 3400-196
      - Requires County Notification

ISSUES & DEFICIENCIES

CURRENT DISCONNECT

- DATCP—Nutrient Management
  - Agriculture Focus
  - Planning
- DNR—Existing Programs
  - Ground and Surface Water Focus
  - Reporting
- DNR—Changing Programs
  - NR 243: CAFO regs
  - NR 151: Runoff Management
  - Phosphorus Issues
    - Pink Sheets for NR 113, NR 204 and NR 214
  - Lack of Nutrient Communication between programs

IF I HAD A FEW FREE MONTHS…

- Update Applications
  - Storage Related
  - Site Approval
- Re-write SWAMP Code
- Develop Training Modules and Videos
- Improve Communication between entities

IF I HAD A FEW FREE YEARS…

- Re-write Codes for Clarity
- Re-write Codes for Specific Inclusions
  - Phosphorus Issues
  - Odor Control
- Continue to Update & Expand Training Opportunities

IF I HAD A MILLION DOLLARS…

Add some minor changes to SWAMP

- Better Storage Tracking
- More Refined Monitoring Calculations

- Fill Staff Vacancies to ensure efficient monitoring

IF I HAD A BILLION DOLLARS…

- Consider Impact from
  - Growth Hormones
  - Teflon issues
  - Fire Retardant Issues
  - Re-growth Issues
- Education
  - If you can measure it, is it really a problem
  - What is a part per trillion

IF I HAD A BILLION DOLLARS…

- Nutrient Related
  - Fund Storage Related Needs
  - Better Storage Options

QUESTIONS?

Fred Hegeman, P.E.

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Sludge and Agriculture – A Nutrient Management Planner's Perspective.

Todd Schaumberg
Consultant
Polenske Agronomic Consulting

Outline

- Background
- Standards
- Communication
- Implementation
- Spreading

Company Background

Mission Statement: Provide independent crop monitoring services and recommendations that are based on firm economic, environmental, and scientific standpoint to agriculture and industry.

NMP Standards

- NR 151.07 Nutrient management: (2) This performance standard does not apply to the application of industrial waste and byproducts regulated under ch. NR 214, municipal sludge regulated under ch. NR 204, and septage regulated under ch. NR 113, provided the material is not commingled with manure prior to application.
- DATCP 590: j. Organic byproducts other than manure (i.e., industrial wastes, municipal sludge, and septage) applied to fields shall be analyzed for nutrient content and applied in accordance with applicable regulations including restrictions on heavy metal content and land application rates.

NMP Standards - Checklists

- DATCP 590 and NR 243 do not include a checkbox that states if applications of all sources of nutrients are included.

Communication with Planner

- Farmer relies on source of sludge.
- Planner relies on Farmer.

Applicator/
Source of Sludge ⟷ Farmer/Grower ⟷ Nutrient Management Planner

Communication no Planner

- Farmer solely relies on source of sludge.
- Source of sludge ‘self-approves’ sites within NR 204 standard.

Applicator/
Source of Sludge

Farmer/Grower

NMP Implementation

- Treatment plant manager obtains applicable permits to comply with NR and DATCP requirements, especially with heavy metal content and land application rates .
- Nutrient Management Planner writes a plan to comply with DATCP 590 and NR 151, especially with nitrogen and phosphorus.

NMP Implementation - Soil Sampling

- NMP standard: Every 4 years soil samples are taken.
- To apply biosolids or sludge soil samples must be taken.

Spreading - Sludge Doesn't Follow County Borders, They Are Applied Where They Are Needed.

Table 3: Historical Biosolids Application by County – 2005 to Present

	2005		2006		2007		2008		2009	
County	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Calumet	222.9	21.1	222.0	19.8	362.3	32.6	279.9	31.9	388.8	47.5
Portage	271.5	25.8	581.8	51.8	214.6	19.3	408.1	59.1	235.2	28.2
Outagamie	90.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shawano	0.0	0	77.3	6.9	0.0	0.0	0.0	0.0	0.0	0.0
Waupaca	0.0	0	0.0	0.0	96.0	8.6	0.0	0.0	182.3	24.3
Waushara	470.5	44.5	241.6	21.5	439.8	39.6	56.6	9.0	0.0	9.0
Total	**1,054.3**	**100**	**1,122.7**	**100**	**1,111.3**	**100**	**744.6**	**100**	**806.3**	**100**

Follow Up

- Background
- Standards
- Communication
- Implementation
- Spreading

Thank You For Your Time and Attention

- Todd Schaumberg
- todd@polenskeag.com
- 920-843-2676

Sludge and Agriculture
(“other wastes”)

Bill Hafs
Brown County
Land and Water Conservation Department
2011 Forum on Land – Applied Wastes from Municipal, Septic and Industrial Sources

2006 Biosolids Other Methods of Disposal

2006 Total

Pit	Gallons
Kevin Ashenbrenner	99,800
Conard Farms	252,800
Ken Dart	147,500
Detrie Farms	154,500
Rob Juneau	108,000
Al Kudick	95,500
Rodney Lieterman	190,500
Steve Leiterman	0
Roger Maternoski	0
Tim Mlesvia	94,000
Wayne Rabas	0
Tom Ronk	193,500
Dennis Rozmarynowski	183,500
Jim Seidel	119,000
Gerald Seidel	171,000
Paul Selner	201,500
Tom Suess	83,000
Joe Sloma	596,000
Larry Stahl	414,500
Brian Stahl (Gerald)	100,000
Gerald Stahl (Dorner)	127,000
Pat Truttman	203,000
Jim & Joe Umentum	209,000
Charles Winnekens	0
	3,743,600

Questions Raised

- Is Manure Storage (NRCS 313 standard) designed for “other wastes”?
- Who are the “other waste” generators?
- How much cropland is approved for “other waste” application and how much is actually being applied?
- Is other waste included in nutrient management plans?
- How can we coordinate with DNR industrial, municipal and septic staff?

Definitions and Rules

Animal Waste:

- NR151 Runoff Management
- ATCP 50 Soil and Water Resource Management Program
- NRCS 590 Nutrient Management (standard)
- NRCS 313 Waste Storage (standard)

"Other wastes":

- NR113 Service Septic or Holding Tanks, Pumping Chambers, Grease Interceptors, Seepage Beds, Seepage Pits, Seepage Trenches, Privies, or Portable Restrooms.
- NR204 Domestic Sewage Sludge Management.
- NR 214 Land Treatment of Industrial Liquid Wastes, By-Product Solids and Sludge's.

Is Manure storage designed for "other wastes"?

- NRCS 313 Waste Storage standard (2006): "This standard does not apply to facilities in which greater than **10%** of the design storage volume **or greater than 25,000 gallons** is occupied by any combination of domestic waste, industrial wastewater generated offsite, or sludge. These types of facilities are defined and regulated under various codes administered by WDNR."
- Other Methods of disposal or distribution report. DNR form 3400-052 identifies storage systems used.

Summary of Proposed Substantial Changes to the Current 313 Standard

- Clarified the intent of the standard with respect to the addition of off-farm organic waste materials to waste storage facilities that are designed using criteria in this standard. **The intent is to require approval of the appropriate regulatory agency <u>before</u> these materials are stored in a 313 structure.** The language in the old standard with respect to "this standard does not apply to facilities in which greater than 10% of the design storage volume……." Has been revised and moved to Section IV to more clearly reflect this intent.

Section IV 313 Review draft 5/11

Many off-farm organic waste materials, including but not necessarily limited to whey, paunch manure, compost, industrial and municipal sludges, and septic tank sludge are regulated by various state codes and **county ordinances**. The owner shall contact the appropriate regulatory authority for approval **prior** to storing any off-farm waste material in a waste storage facility that has been constructed using the criteria in this standard.

Who are the "other waste" generators?

- 1 ALLEN CANNING PULASKI PLANT
- 2 ARLA FOODS PRODUCTION LLC
- 3 ARROW SANITATION
- 4 ASHLEY SEPTIC SERVICE
- 5 BARTZ SEPTIC SERVICE
- 6 BELGIOIOSO CHEESE INC CHASE
- 7 BELGIOIOSO CHEESE INC DENMARK
- 8 BELGIOIOSO CHEESE INC DENMARK
- 9 BELGIOIOSO CHEESE INC LANGES CORNER
- 10 BELGIOIOSO CHEESE INC PULASKI
- 11 DENMARK WASTEWATER TREATMENTFACILITY
- 12 FOREMOST FARMS USA DEPERE
- 13 FOX VALLEY SEPTIC SERVICE INC
- 14 GREEN BAY DRESSED BEEF LLC
- 15 HOLLAND SD 1 WASTEWATER TREATMENT
- 16 LAKESIDE FOODS INCORPORATED – SEYMOUR
- 17 MANITOWOC WASTEWATER TREATMENT
- 18 MORRISON SANITARY DISTRICT NO 1
- 19 PACKERLAND PACKING COMPANY INC
- 20 RENIER SANITATION SERVICE
- 21 SANIMAX AGS INC.
- 22 TIMMAR SANITATION
- 23 TREGA FOODS INC LUXEMBURG PLANT
- 24 TWO RIVERS WASTEWATER TREATMENT
- 25 WILLIAM WALDVOGEL TRUCKING
- 26 WRIGHTSTOWN SANITARY DISTRICT 2

- **Companies that land applied waste in Brown County in 2006** (Information provided by DNR)

How Much Land is approved for application of "other waste"

- DNR approved land spreading sites Brown County 2/14/07:

- Industrial = 566 sites, 23,214 acres, 18 facilities
- Municipal = 243 sites, 4,854 acres, 9 facilities
- Septage = 31 sites, 1,300 acres, 8 facilities

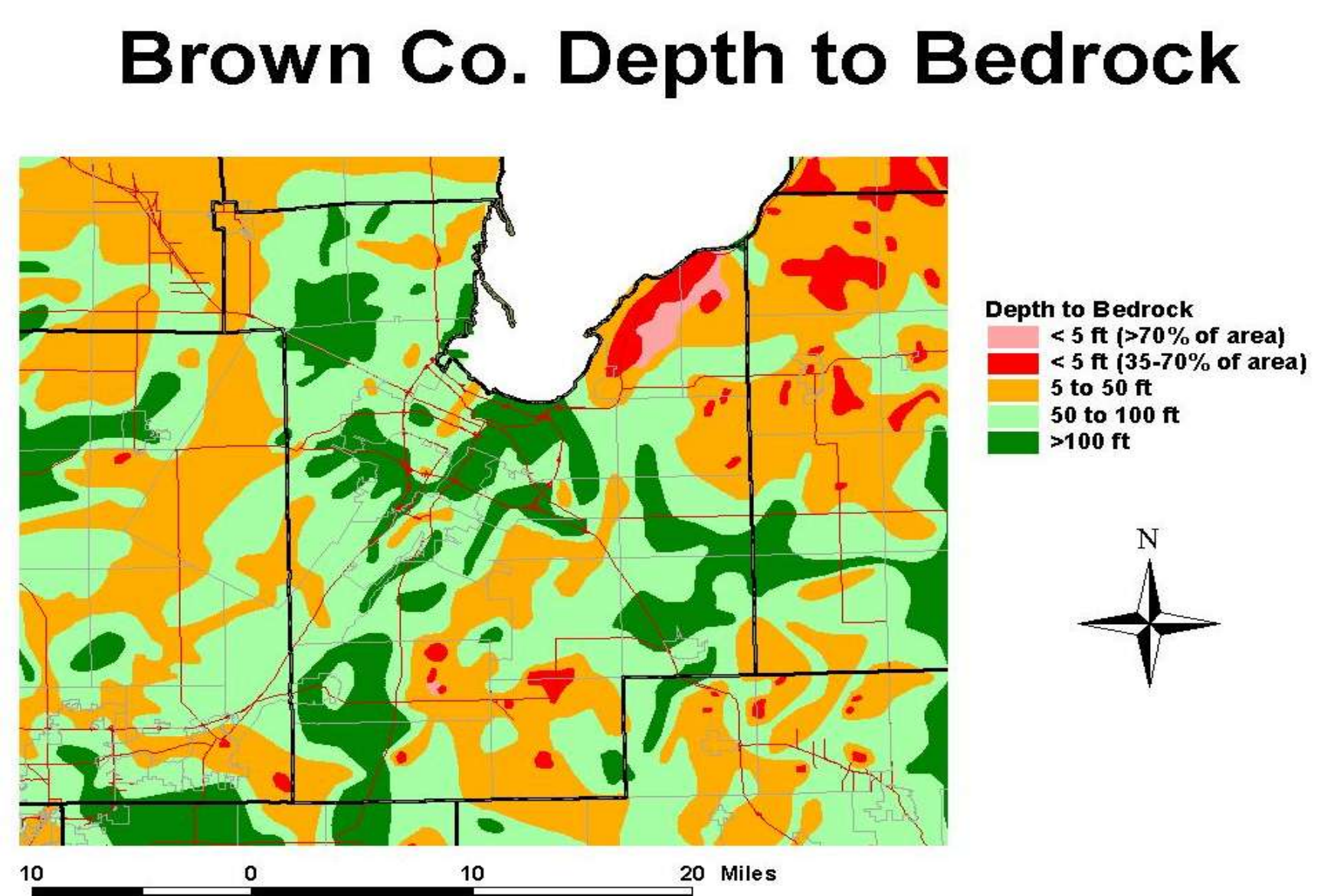
Total = 29,368.9 acres / 162,000 acres total cropland acres in Brown County or **18%** approved for land spreading of other wastes. (information provided by DNR)

How much "other waste" is actually being applied?

- Animal waste per year from dairy and beef livestock = 551,921,154 gal per year.
- Industrial Municipal Septic waste land applied = 41,759,400 gallons/ year. (DNR Form 3400-55)

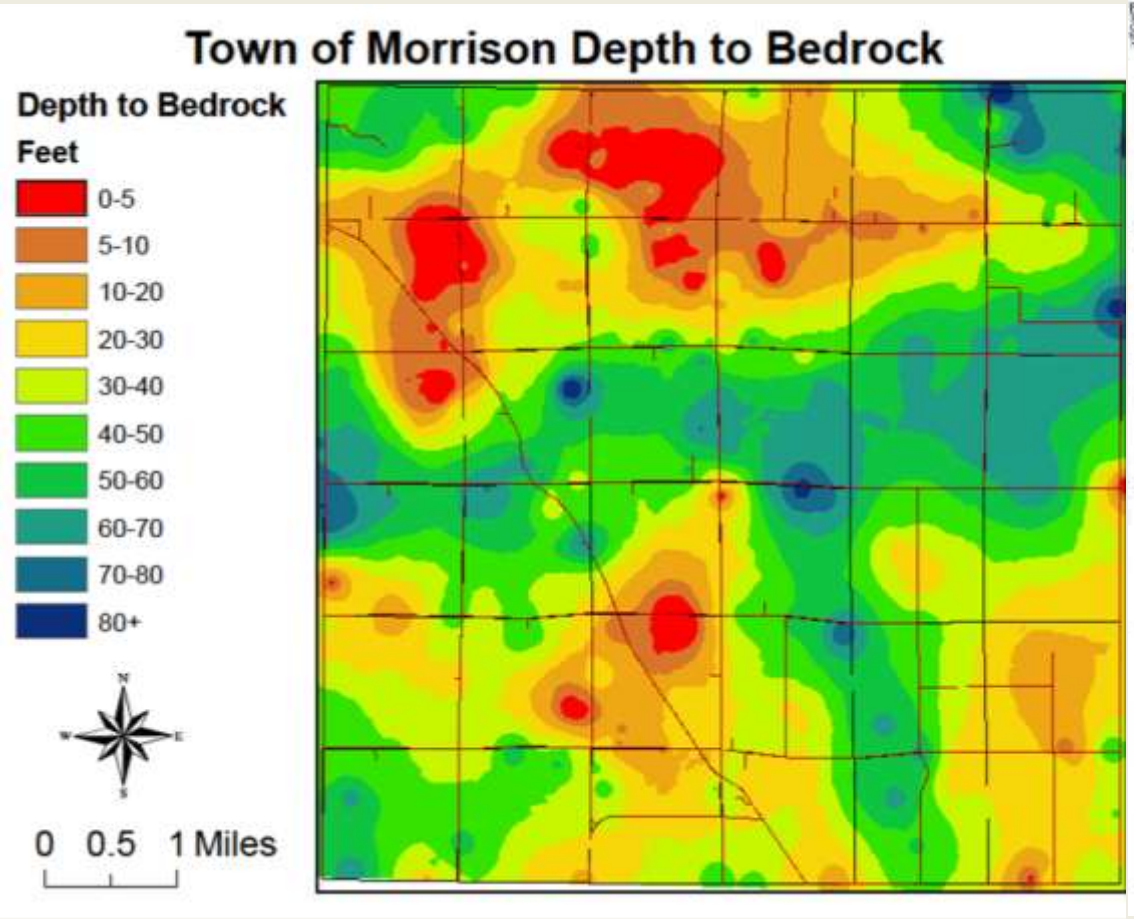
Industrial, Municipal, Septic waste = **7%** of total waste being land applied in Brown County. (2008)

Where is other waste being applied? Mapping information available in 2005



Depth to Bedrock

Approved sites



Is other waste required to be included in nutrient management plans?

- **NR 151.07(1)** All crop producers and livestock producers that apply manure **or other nutrients** directly or through contract to agricultural fields shall comply with this section.

- **Currently less than 10% of "other waste" is included in Brown County out of 115,000 acres of 590 plans from 2010.**

DNR Form 3400-052 – Jan 31 due date

State of Wisconsin
Department of Natural Resources
dnr.wi.gov

Submit report annually by January 31

Other Methods of Disposal or Distribution Report
Form 3400-052 (R 10/04)
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Notice: Completion and submission of this form is mandatory under s. 283.55, Wis. Stats., and chs. NR 204 or 214, Wis. Adm. Code, or s. 281.48(3)(a), Wis. Stats., and ch. NR 113, Wis. Adm. Code. Failure to properly complete and submit this form is a violation of s. 283.91 or 281.48, Wis. Stats., and may result in a monetary penalty and/or imprisonment. Personally identifiable information on this form is not intended to be used for any other purpose.

1. WPDES Permit No.: _____ Sr. License No. _____
Permittee/Licensee Name
FID No.
County _____
Total Municipal Sludge Generated (If Applicable) _____ UNITS: _____ (Gal., Tons, Metric Tons or Cubic Yards)
Total Municipal Sludge Landfilled, Incinerated, or LD Distributed (If Applicable) _____ UNITS: _____ (Metric Tons)

2. Year submitting for: 2007

RETURN FORM TO: BUREAU OF WATERSHED MANAGEMENT
BOX 7921
101 S. WEBSTER STREET
MADISON, WI 53707-7921

REVIEW INSTRUCTIONS ON BACK. ***Note: Tons and metric tons must be reported as dry weight.

3. End Line*	4. DNR Permit/License Number of Receiving Entity	5. Name of Treatment or Receiving Entity	6. Outfall Number**	7. Total Amount Treated, Disposed or Distributed	8. Units*** (Gal., Tons, Metric Tons or Cubic Yards)
m			002	55,000	gal
m			002	38,500	gal
m			002	115,500	gal
m			002	44,000	gal
m			002	11,000	gal
m			002	49,500	gal
m			002	346,500	gal
m			002	82,500	gal
m			002	27,500	gal

Comments:

L = Landfill, I = Incinerate, E = Purchase an exceptional quality product, M = Manure Pit, A = Another facility for further treatment and/or ultimate disposition, H = Hauled out-of-state for land or treatment and/or ultimate disposition.

* If the waste applied is septage, indicate 000 if septic tank waste, 001 if holding tank waste, or 007 if more than 25% grease interceptor waste.

I hereby certify that to the best of my knowledge, the statements are true and correct.

Signature of Original Official or Authorized Agent	Print or Type Name	Title	Date Signed

How can we coordinate with DNR industrial, municipal and septic staff?

- Unification of administrative codes occur regarding land application of wastes including reporting dates. (June 1 for 590 and January 31 the following year for industrial waste).
- New DNR form 3400 – 196 Notice of Intent to Store Industrial Waste In Existing Off – Site Manure Structures. Need coordination between DNR and Counties on Storage Facilities.
- Some counties may need to update animal waste storage facilities to allow for storage of both animal and industrial waste.
- New maps will lead to better land application permits and 590 plans.

State of Wisconsin
Department of Natural Resources
dnr.wi.gov

Notice of Intent to Store Industrial Wastes in Existing Off-Site Manure Structures

Form 3400-196 (7/10)

Notice: Collection of this information is authorized under s. 283.55, Wis. Stats., and Chapter NR 214, Wis. Adm. Code. Failure to provide this information may result in penalties. Personally identifiable information collected will be used for program administration and other governmental programs and may be provided to requesters as required by Wisconsin's Open Records law (ss. 19.31-19.39, Wis. Stats.).

Wastewater Generator Information

Legal Name of Operation			WPDES Permit No.
Address - Street, Route or Box	City	State	ZIP Code

Amount of waste to be directed to storage facility: Maximum Month: _____ gallons Annually: _____ gallons

Location of Storage Structure

Farm Name		County	Township
Address - Street, Route or Box	City	State	ZIP Code

Quarter/Quarter	Quarter	Section	Town Number N	Range Number ☐ E ☐ W	County Parcel No. or Computer Number

Storage Structure Design

Storage Type:

☐ Glass lined ☐ Clay ☐ Concrete ☐ Geomembrane ☐ Geosynthetic Clay ☐ Other (describe) _____

IMPORTANT: Attach documentation by a professional engineer or other qualified individual that design and construction of the structure meets NRCS Standard 313 or NR 213, Wis. Adm. Code, requirements.

Construction Date: _____ Storage Capacity: _____ gallons

Is the proposed storage structure currently being used for storing manure? ☐ Yes ☐ No

If no, when was the last date manure was stored in the structure? _____

If yes,

- How many days of storage are provided by the structure without addition of liquid industrial wastes? _____ days
- How many days of storage are provided by the structure with addition of liquid industrial wastes? _____ days
- Does the amount of industrial waste to be stored exceed 10% of the materials stored in the storage structure? ☐ Yes ☐ No

  If yes, submit documentation by a professional engineer or other qualified individual that design and construction of the structure complies with the requirements of NR 213, Wis. Adm. Code.

Generator Certification

I certify that I am familiar with the information contained in this notice and that to the best of my knowledge and belief such information is true, complete and accurate.

Printed or Typed Name of Official Representative	Title
Signature of Official Representative	Date Signed

Land Application and Farmer/Producer Certification

Does the farmer/producer have a current nutrient management plan? ☐ Yes ☐ No

I and/or my agronomist have been provided with a waste analysis of the proposed waste. I certify that the proposed waste will be factored into my nutrient management plan or other land application practices.

Printed or Typed Name of Farmer/Producer	Signature of Farmer/Producer	Date Signed

County Land Conservation Department Notification

The wastewater generator has discussed with appropriate County Land Conservation Department staff the proposed use of the manure storage facility for storage of industrial waste. The County has determined that its resource management issues relating to storage and land spreading of these industrial wastes have been addressed and that storage of industrial waste is consistent with cost-share agreement conditions that may apply to the facility.

Printed or Typed Name of Official County Representative	Title
Signature of Official County Representative	Date Signed

The WPDES permittee shall submit this completed form along with the request for approval to discharge wastes to the manure storage structure to its DNR Regional contact.

Land-Applied Sludge/Biosolids and Its Environmental and Human Health Impacts

Mark Borchardt, Ph.D.

USDA-Agricultural Research Service
Environmentally Integrated Dairy Management Research Unit
Marshfield, Wisconsin

Biological Fact #1

Cows poop

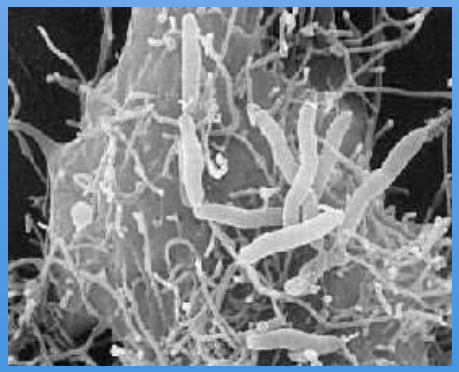
Biological Fact #2

Humans poop, too!

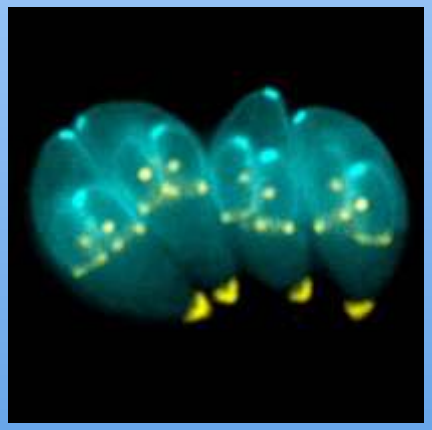
Biological Fact #3

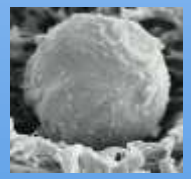
Poop contains undesirable contaminants

Bacteria (e.g., *Campylobacter*, *Salmonella*, *E. coli* O157:H7, *Aeromonas)*

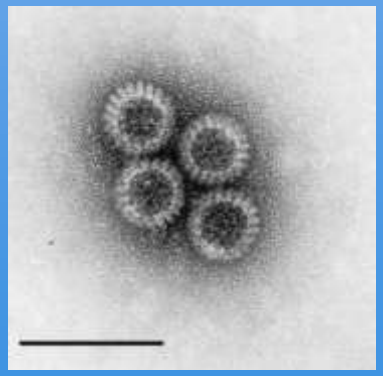


Protozoa, (e.g., *Cryptosporidium*, *Giardia*, *Toxoplasma)*





Viruses (e.g., adenovirus, enterovirus, rotavirus)



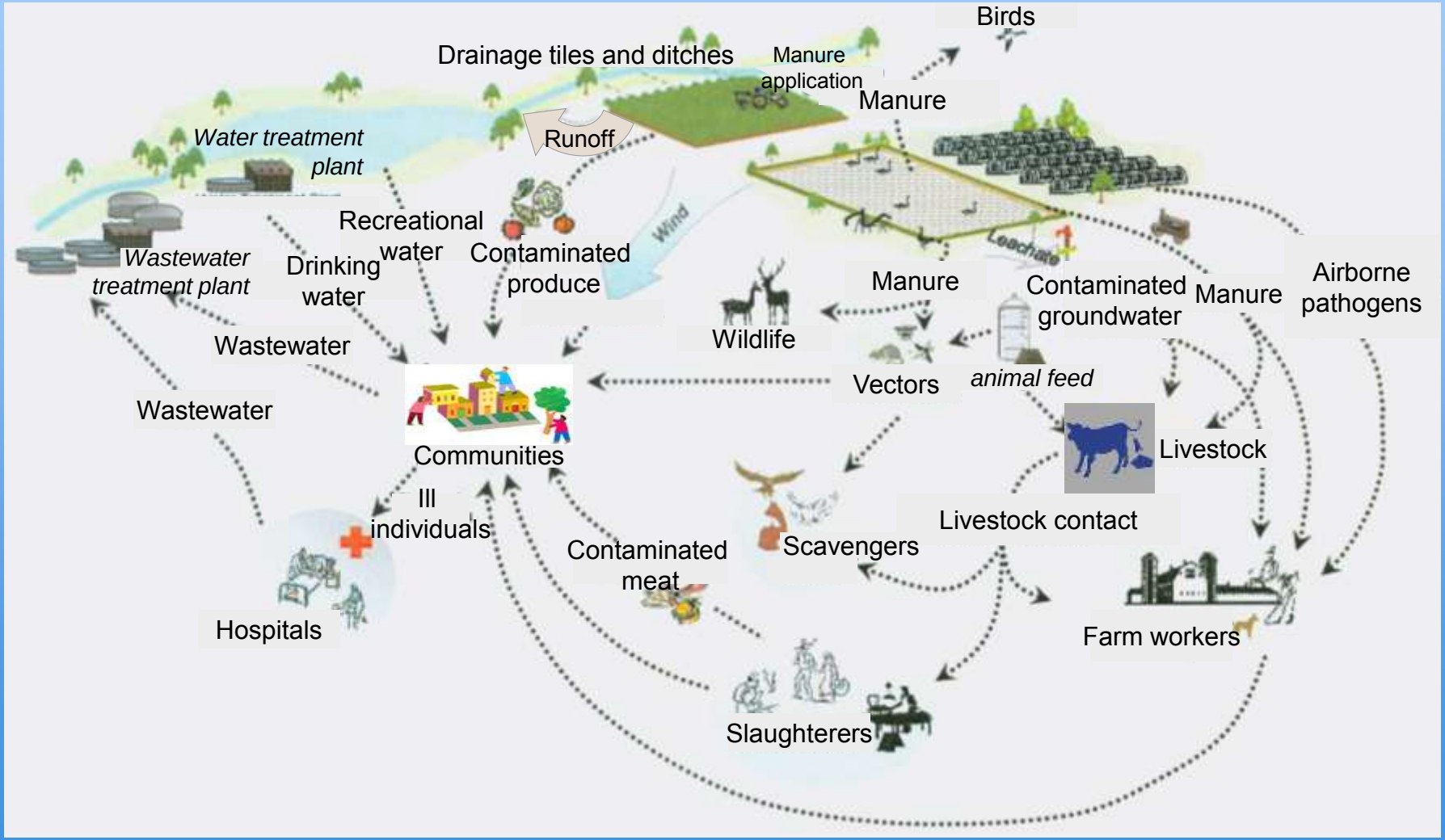
Biosolids' Double-Edged Sword

- Biosolids field-application is a cost-effective and sustainable approach for optimal soil tilth and fertility

<u>BUT</u>

- Biosolids may contain contaminants harmful to humans, livestock, and the environment
- Societal goal: Maximize the beneficial uses of biosolids while minimizing environmental contamination and human health risk

Human and Livestock Fecal Waste Movement in the Environment



Rogers and Haines, 2005, EPA/600/R-06/021

Wisconsin Fecal Waste Loading Rates

- Biosolids: Estimated 114,000 dry tons applied annually to 1% of agricultural fields
- Dairy manure: Estimated 26.5 million wet tons applied annually to nearly all agricultural fields
- Assuming 0.5 conversion factor for wet to dry manure, about 100x more manure is applied than biosolids

Caveat: Comparing fecal loading rates provides no basis for comparing loading rates of contaminants

Knowledge Gradient of the Health Effects of Biosolids

Decreasing Knowledge

- Contaminants in biosolids
- Contaminants in soil
- Contaminants in plants and livestock
- Exposure to humans thru direct contact of indirectly via plants and livestock
- Health effects resulting from exposure

National Library of Medicine
763 citations for biosolids
24,000 citations for sewage sludge
Only 20-some epidemiological studies assessing health effects

Biosolids: Heavy Metals

- Regulated: arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc
- List derived from 1988-1989 National Sewage Sludge Survey
- EPA decided to exempt from regulation those chemicals detected at less than 10% frequency

Biosolids: Heavy Metals Health Risks

- National Research Council 2002 review of the EPA Part 503 Rule found no evidence for adverse health effects from heavy metals.
- 20 year annual application of biosolids, a University of Arizona study, found only modest increases in metals in the top soil layer (Pepper et al. 2008).
- Metal content of biosolids has been decreasing over time because of improved controls at point sources.

Biosolids: Heavy Metals Knowledge Gaps

- Conduct another National Sewage Sludge Survey to re-evaluate the chemical composition of biosolids.
- Consider all exposure routes, not just direct ingestion, and include indirect exposure via consumption of plants and livestock.
- Apply recent advances in the science of risk assessment to re-evaluating biosolids chemical standards (e.g., use multi-path exposures, quantify uncertainty in risk estimate).

Biosolids: Organic Chemicals

- None regulated at this time by the EPA Part 503 Rule
- Kinney et al. (2006) surveyed 9 biosolids from 7 States for 87 organic chemicals – found 55, 30-45 per biosolid
- There are 50 million chemicals listed in the Chemical Abstracts registry

Biosolids: Organics Health Risks

- PBDEs (flame retardants) endocrine disrupter, carcenogenic
- Polychlorinated alkanes (plasticizer) possibly carcenogenic
- Perfluorochemicals (non-stick cookware) possibly endocrine disruption
- Polychlorinated naphthalenes (applications similar to PCBs) toxic
- Bisphenol A (plasticizer) estrogen mimic

See Clark and Smith (2011) for comprehensive list of organics in biosolids

Biosolids: Organics Knowledge Gaps

- National Research Council 2002 review recommends EPA re-do chemical selection for regulation and update the risk assessment, particularly related to human exposure and organics fate and transport (Did this happen?)
- Example: Matscheko et al (2002) showed 20 years after biosolids application, PBDEs in soil were still 8,000x background levels
- There is no evidence of human health risk from organic chemicals in land-applied biosolids, however continued vigilance is necessary (Clark and Smith 2011).

Biosolids: Pharmaceuticals and Personal Care Products

- PPCPs are too numerous to list…
- Antibiotics
- Estrogenic hormones
- Androgenic hormones
- Fragrances (metabolites more toxic than the parent compounds
- Non-steroidal anti-inflammatory drugs e.g. ibuprofen

51% of worldwide pharmaceutical sales are in the U.S. (Xia et al. 2005)
Top Six: Hydrocodone, acetaminophen, Lipitor, Atenolol, Synthroid, Premarin

Biosolids: PPCPs

- National Research Council 2002 review concluded there was inadequate evidence that PPCPs occurred in biosolids
- Recent studies (albeit few) show PPCPs can be detected in biosolids
- Wastewater treatment removes 30% to 90% of PPCPs, likely because those PPCPs that are hydrophobic partition into the sludge fraction of the treatment system

Biosolids: PPCPs Knowledge Gaps

- PPCP types and concentrations in biosolids needs more research
- Need more studies on PPCP fate and transport in agricultural fields. One study (Kinney et al. 2008) showed PPCPs bioaccumulated in earthworms in an agricultural field with applied biosolids.
- There are no studies on PPCPs in biosolids and human health risk.
- Composting shows promise as a means of removing PPCPs in biosolids – needs more research

Biosolids: Known Pathogens in Class B

Enteric viruses	**Bacteria**
Adenovirus	E. coli O157:H7
Enterovirus	Salmonella spp.
Norovirus	Campylobacter spp.
Hepatitis A virus	Shigella
Rotavirus	Yersinia
Hepatitis E virus	
Protozoa	**Helminth worms**
Cryptosporidium	
Giardia	
Toxoplasma	

Modified from Pepper et al. 2008

Biosolids: Pathogen Health Risks

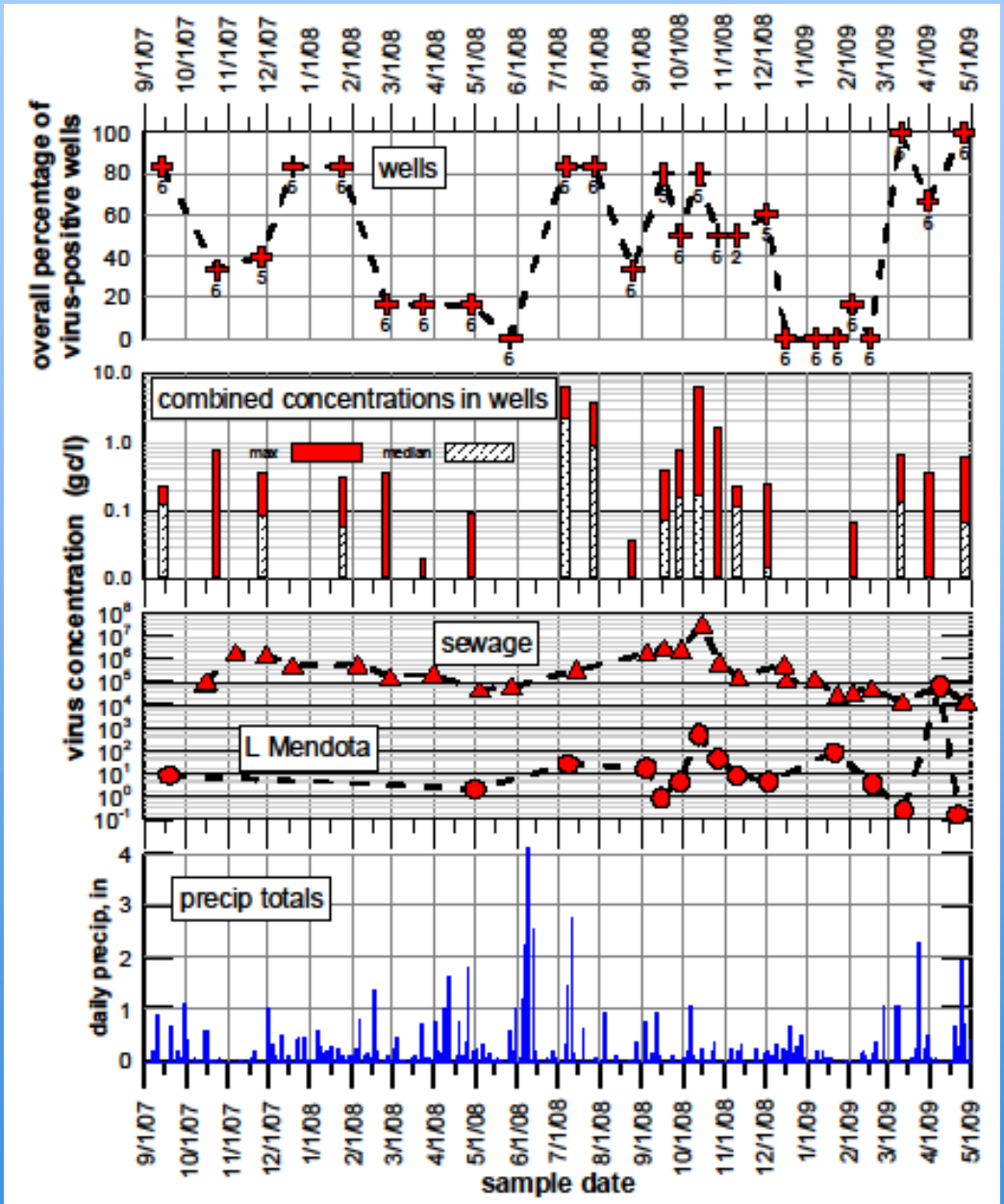
- Literature search found only one disease outbreak related to land-applied biosolids – *Staphylococcus aureus*, controversial study (Lewis et al. 2002)
- Risk assessment shows risk of Salmonella infection from aerolsolization during Class B biosolids application is very low, approximately $1/10^8$ (Based on 6 days/year application at an exposure distance of 30.5 meters) (Pepper et al. 2008)
- Risk assessment for Class A biosolids: direct ingestion risk = 2/1000; groundwater = $2/10^7$; aerosol exposure = $7/10^5$ 30 meters from the source to $5/10^5$ 250 m from source, wind speed = 10m/s (Eisenberg et al. 2008)

In the Eisenberg study, drinking groundwater in a karst setting resulted in an infection risk 10-fold greater than direct ingestion

Biosolids: Pathogen Knowledge Gaps

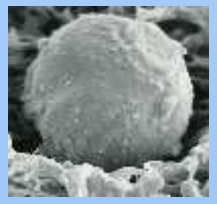
- Reliance on fecal coliforms and Salmonella as indicators of biosolids sanitary quality is outdated. Use new technologies for a national survey of pathogens in biosolids.
- Evaluate biosolids production methods for effectiveness in inactivating pathogens
- Evaluate potential for re-growth of bacterial pathogens in soil after biosolids land application
- More research is needed on biosolids pathogen contamination of groundwater and surface runoff

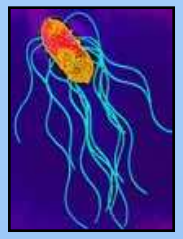
Virus concentrations in Madison's sewage influent, Sept 2007 to May 2009



Coincidence of virus serotypes in wells, sewage, and lakes. In many cases wells and sewage contained identical virus serotypes. Numbers and letters refer to virus serotypes; E6 (echovirus 6), Adenovirus 41, etc.

	Sample round	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
	median sample date	14-Sep-07	24-Oct-07	26-Nov-07	18-Dec-07	24-Jan-08	26-Feb-08	24-Mar-08	28-Apr-08	27-May-08	7-Jul-08	29-Jul-08	26-Aug-08	17-Sep-08	26-Sep-08	13-Oct-08	27-Oct-08	10-Nov-08	2-Dec-08	18-Dec-08	7-Jan-09	23-Jan-09	3-Feb-09	18-Feb-09	11-Mar-09	31-Mar-09	27-Apr-09
sewage	A41	x		x	x		x			x	x	NS	x	x			x	x	x	x	x	x	x	x	x	x	x
	A31				x				x	x	x	NS	x		x	x	x	x	x	x	x	x	x		x		x
	A2	x	x		x	x		x				NS														x	
	E3		x								x	NS							x	x	x						
	E30											NS												x	x		
	A7										x	NS															
	E11		x	x			x		x			NS															
	CoxA16											NS															
	CoxB3											NS															
	CoxB4			x								NS												x			
all wells	A41	x		x	x	x		x			x	x	x	x	x	x	x	x	x				x		x	x	x
	A31					x					x	x	x				x		x						x		
	A2	x		x	x	x					x			x													x
	E3		x								x	x															
	E30																								x	x	
	A7	x				x					x	x															
	E11		x	x					x																		
	CoxA16																										
	CoxB3																										
	CoxB4																								x		
lakes	A41	x	NS	NS	NS	NS	NS	NS		NS	x	NS		x	x	x	x	x	x			x			x		
	A31		NS	NS	NS	NS	NS	NS		NS		NS				x		x									
	A2	x	NS	NS	NS	NS	NS	NS	x	NS	x	NS															
	E3		NS	NS	NS	NS	NS	NS		NS	x	NS														x	x
	E30		NS	NS	NS	NS	NS	NS		NS	x	NS															
	A7		NS	NS	NS	NS	NS	NS		NS		NS															
	E11		NS	NS	NS	NS	NS	NS		NS		NS												x	x		
	CoxA16		NS	NS	NS	NS	NS	NS		NS		NS															
	CoxB3		NS	NS	NS	NS	NS	NS		NS		NS															
	CoxB4		NS	NS	NS	NS	NS	NS		NS		NS															





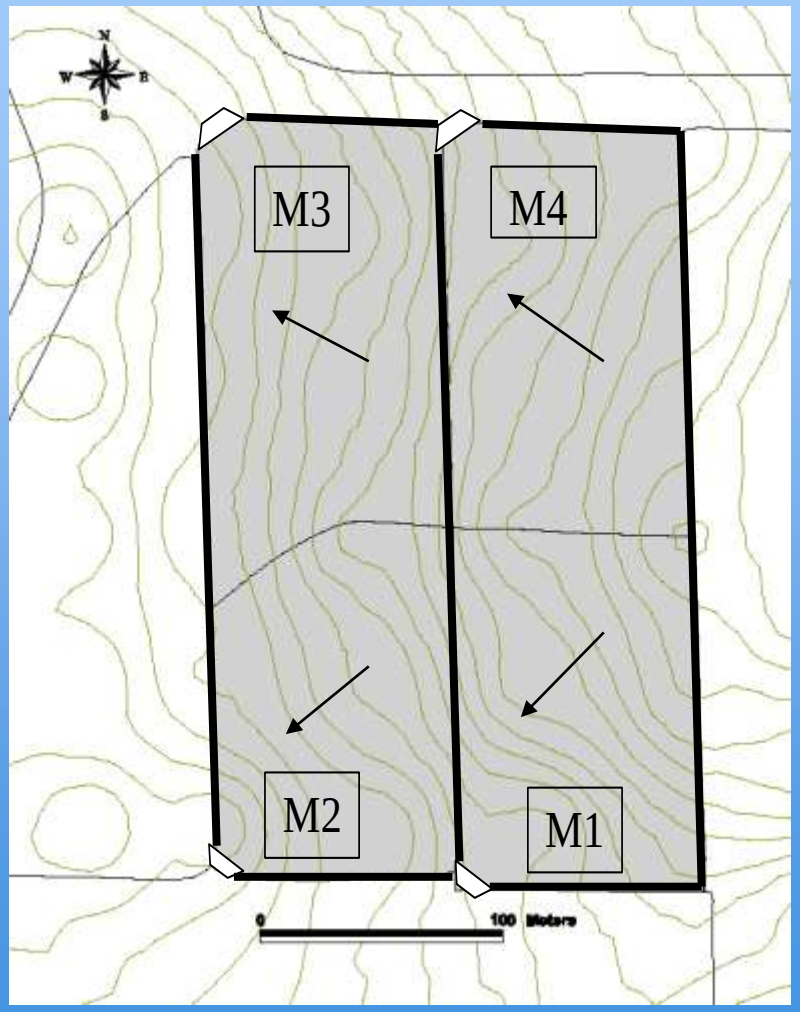
Transport of Bovine Manure-Borne Pathogens in Surface Runoff in a Corn Silage System

Mark Borchardt, Susan Spencer,
Matt Volenec, Sherif Nagi

Craig Simson and Bill Jokela

USDA-ARS Institute for Environmentally Integrated Dairy Management

Field Site



Located at the North farm of the UW/USDA-ARS Research Station in Marshfield, WI

Withee silt loam with 1-3% slope

Fields divided by drainage ditches and berms into four drainage areas

Each field about 4 acres, cropped in corn

Manure application once per year, about 5,800 gallons/acre

Runoff Monitoring Stations

H-flume: stage measured using bubble-pressure transducer

Pathogens: refrigerated glass wool filtration; event-based sampling, not flow-weighted

Nutrients, sediment, and indicator *E.coli*: automated refrigerated sampler with time-based sampling

Controlled remotely by radio telemetry

Fall Manure and Chisel Plow (Control, M1)

Fall after chisel plow

Spring after field cultivate/plant

Rye Cover Crop with Spring Manure and Chisel Plow (M2)

Fall

11/7/08

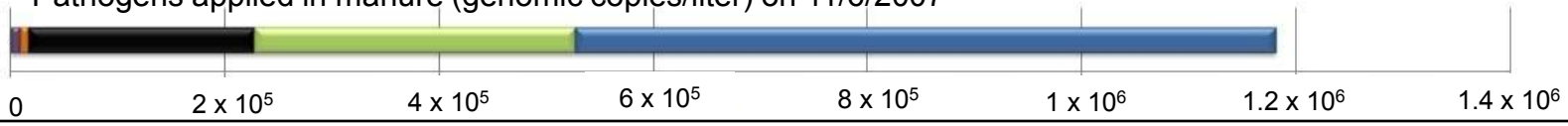
Spring

5/8/09

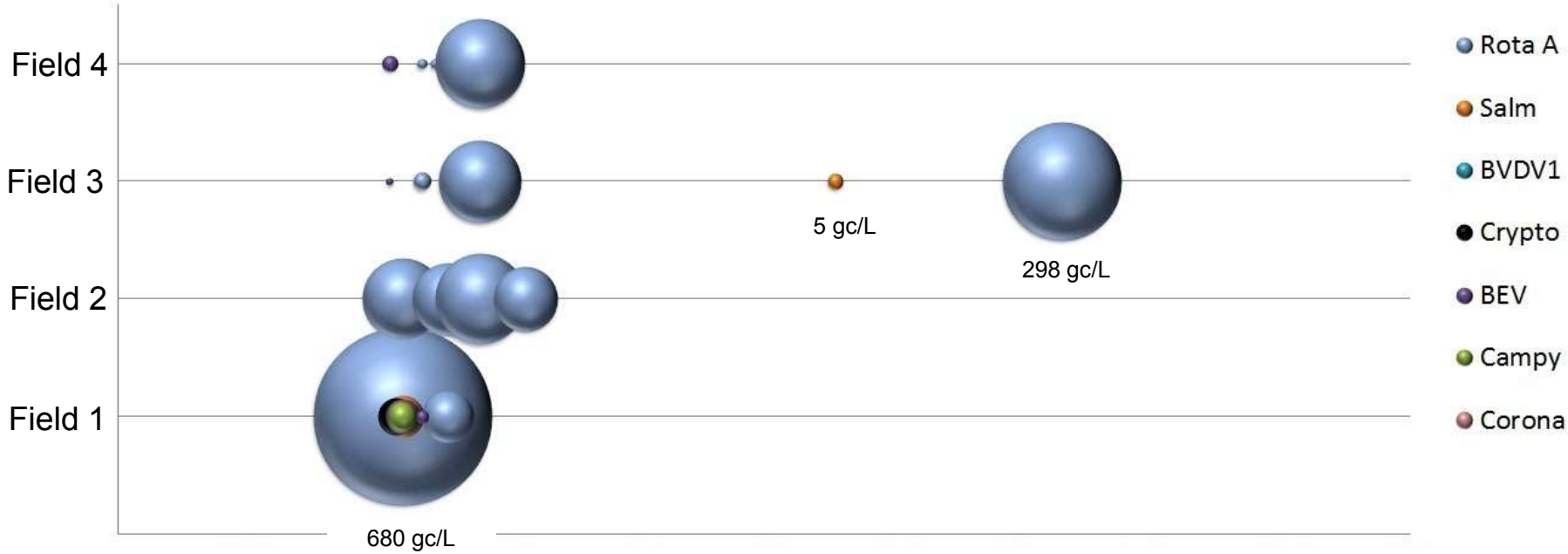
Fall Surface-applied Manure with Spring Chisel Plow (M3)

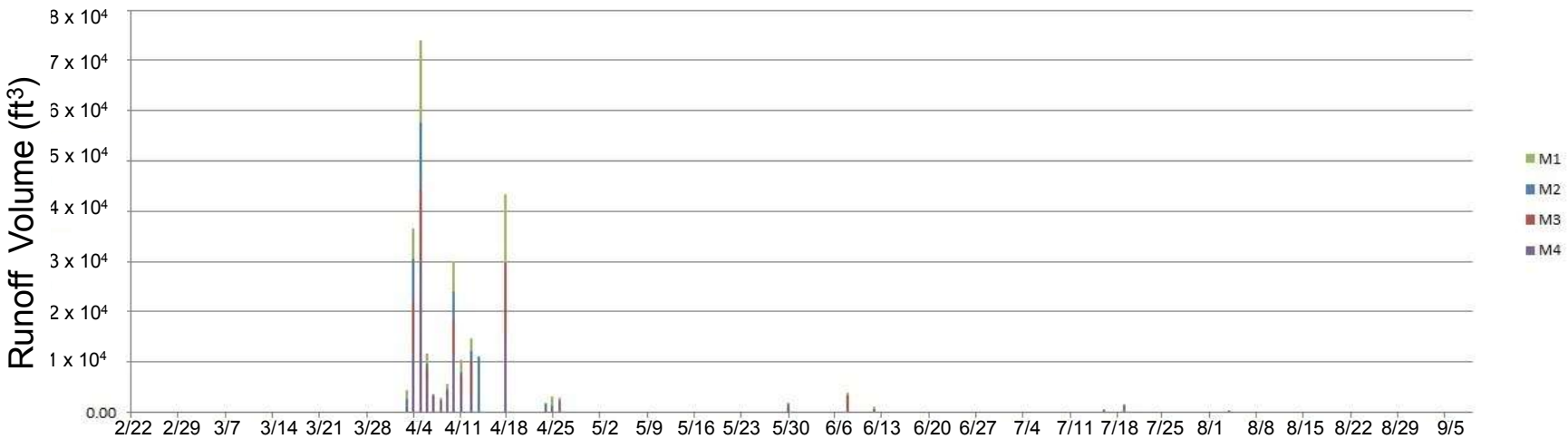
Vegetative Waterway/ Buffer-Field Border with fall manure and chisel plow (M4)

Pathogens applied in manure (genomic copies/liter) on 11/6/2007

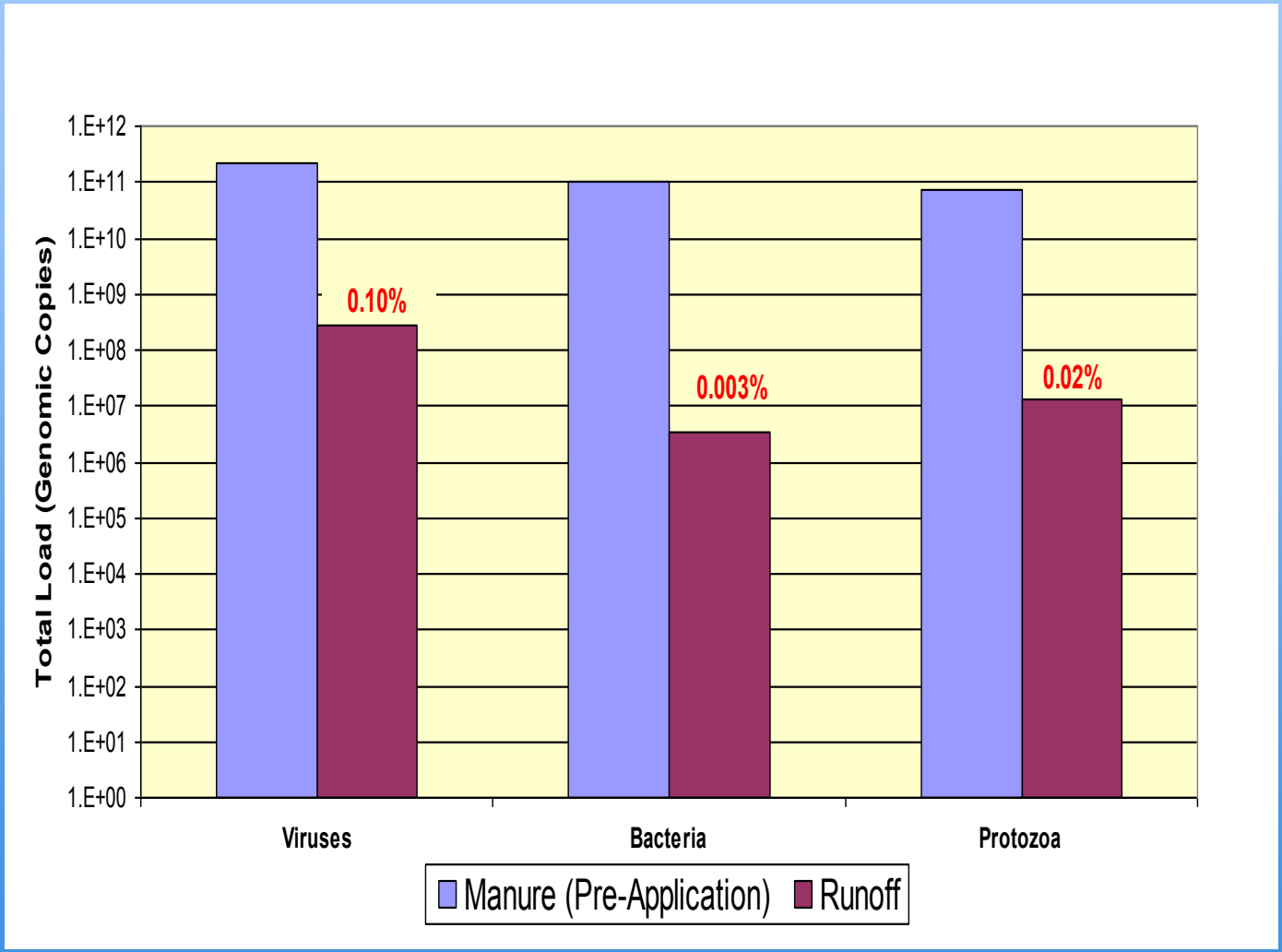


Pathogens in Runoff, Year 2008





Total Pathogen Runoff in 2008 Compared to Total Pathogens Added to All Fields (M1 – M4) from the Fall 2007 Manure Application



Summary

- The contaminant composition of biosolids can vary greatly and as the fate and transport of contaminants is specific to the applied site, it is very difficult to make any generalizations about health effects.
- With the current state of knowledge there is no evidence that land-applied biosolids result in egregious health effects.
- However, absence of evidence for adverse health effects does not mean there is absence of an effect.

Preventing It from Hitting the Fan…

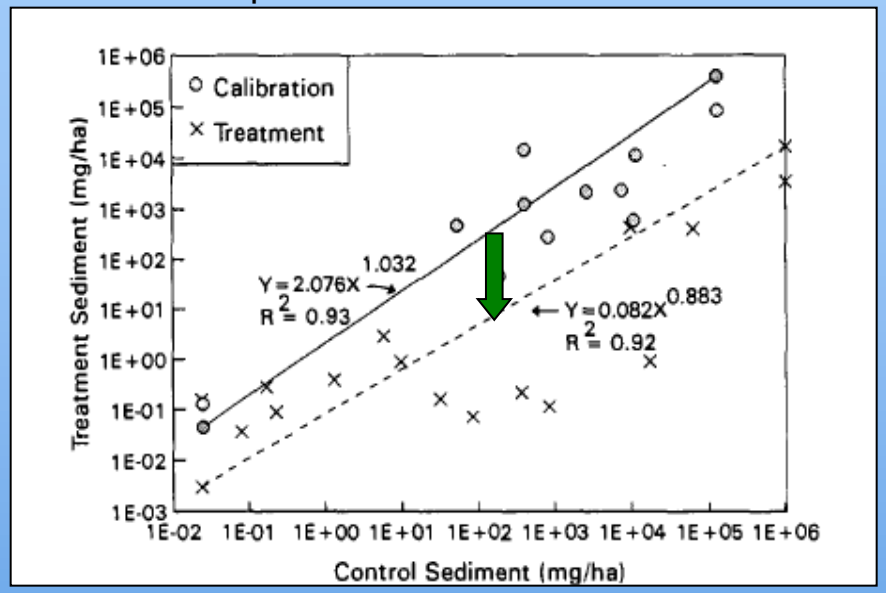
Working together the agricultural industry, researchers, and policymakers can:

- Identify research priorities
- Generate ideas
- Test potential solutions

Contact Information
Mark Borchardt
USDA-ARS
Environmentally Integrated Dairy Management Research Unit
Mark.Borchardt@ars.usda.gov
715-387-4943

Study Design – Paired Watershed

Example from Clausen et al. 1996



The relationship between two watersheds (i.e., fields) is compared between two time periods, calibration and treatment periods. Any shift in the regressions represents the treatment effect.

Calibration period: August 2006 – October 2008

<u>Treatments</u>

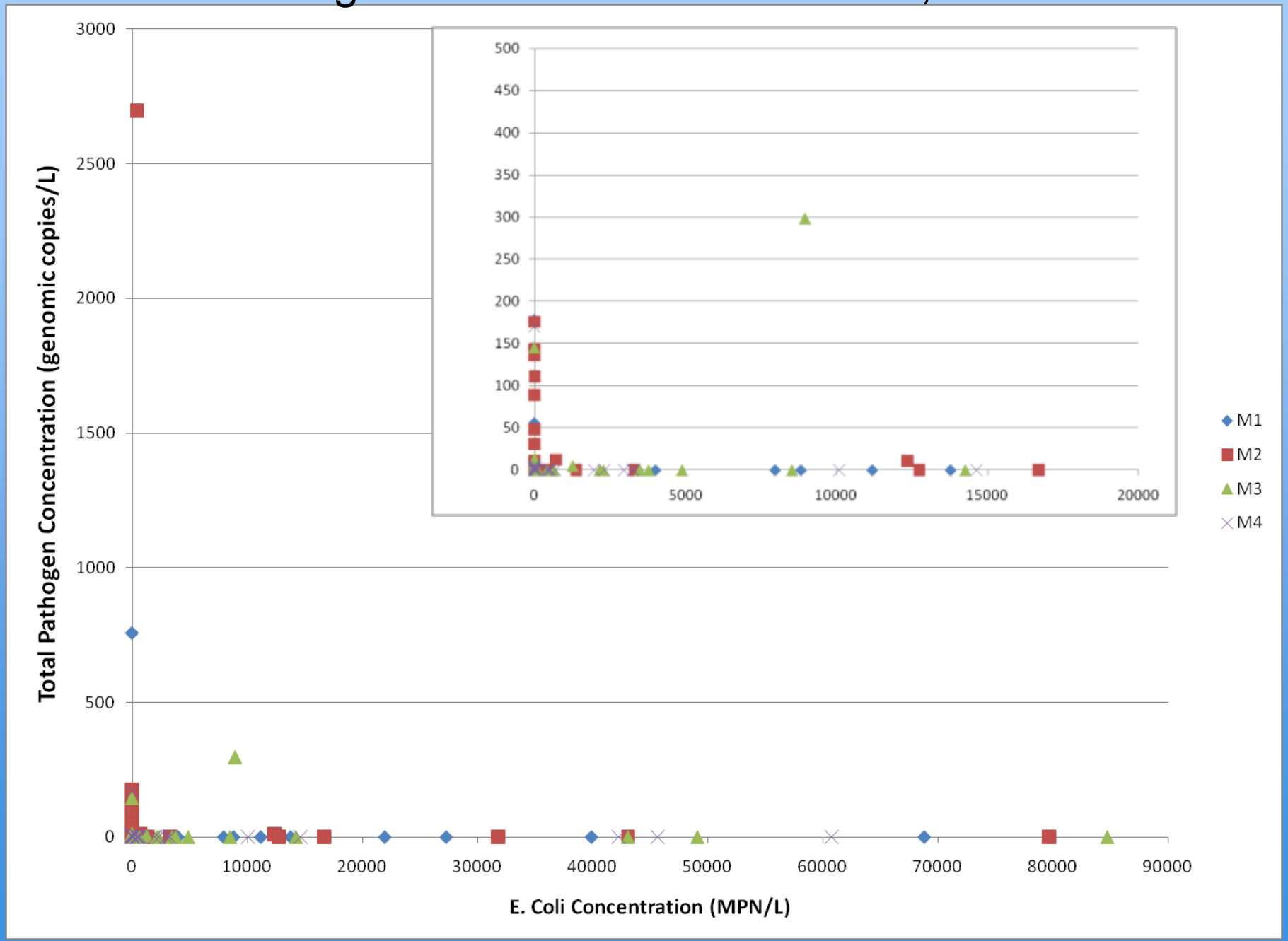
M1: Control, fall applied dairy manure with same day chisel plow

M2: Fall seeded rye cover crop, spring manure and chisel plowing

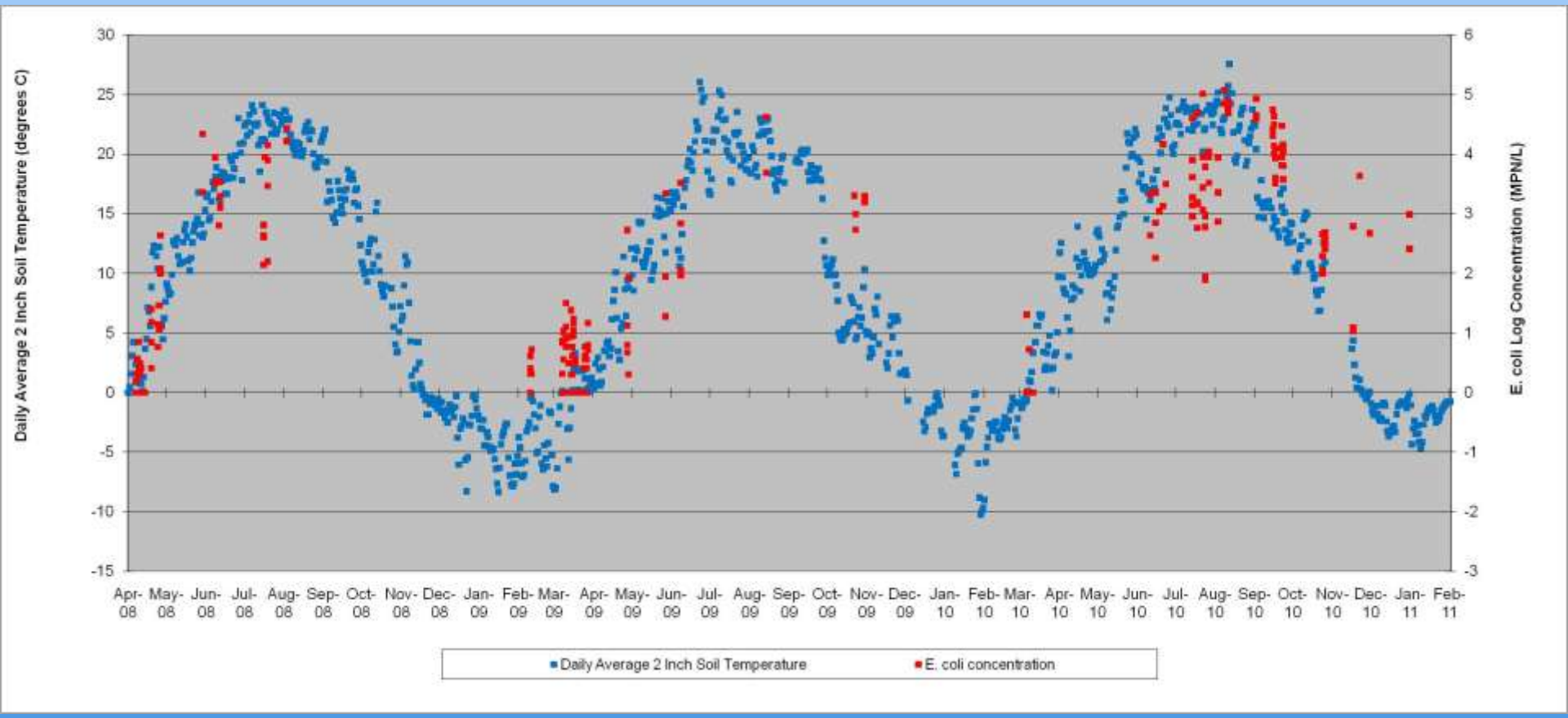
M3: Fall surface-applied manure with spring chisel plowing

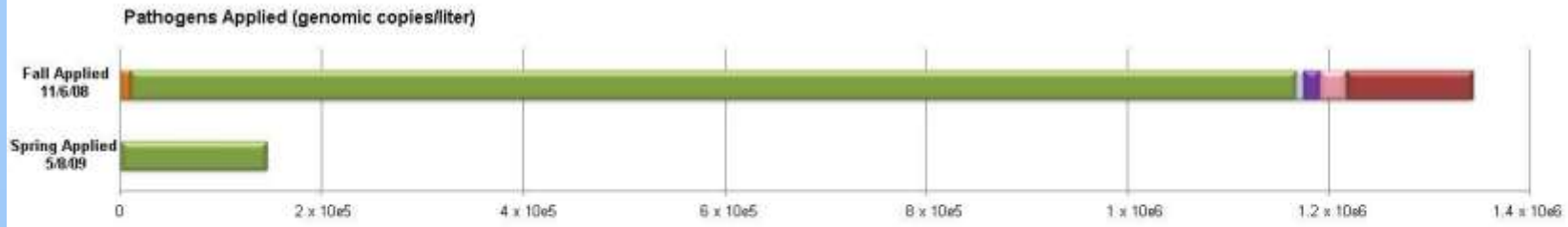
M4: Fall manure/chisel plowing with permanent vegetative buffer strips

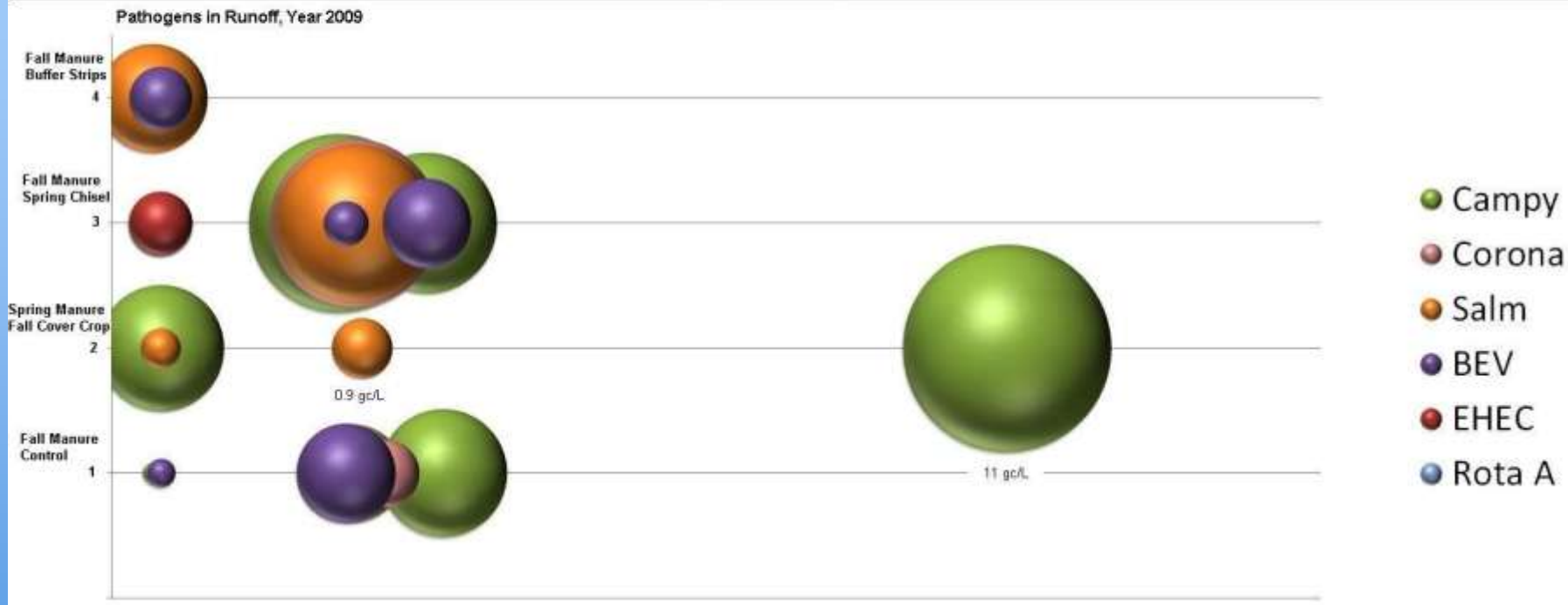
Total Pathogen vs *E. coli* Concentrations, 2008-2010

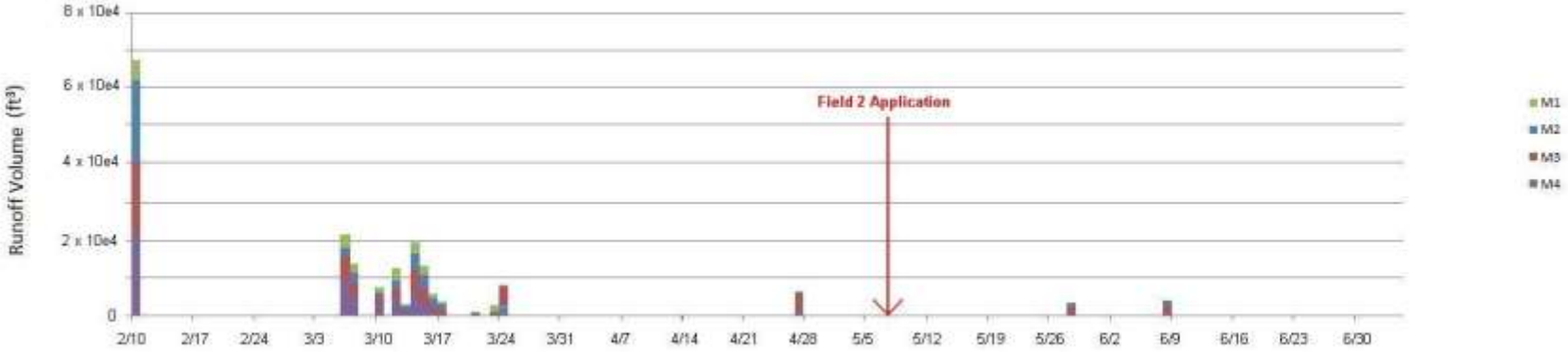


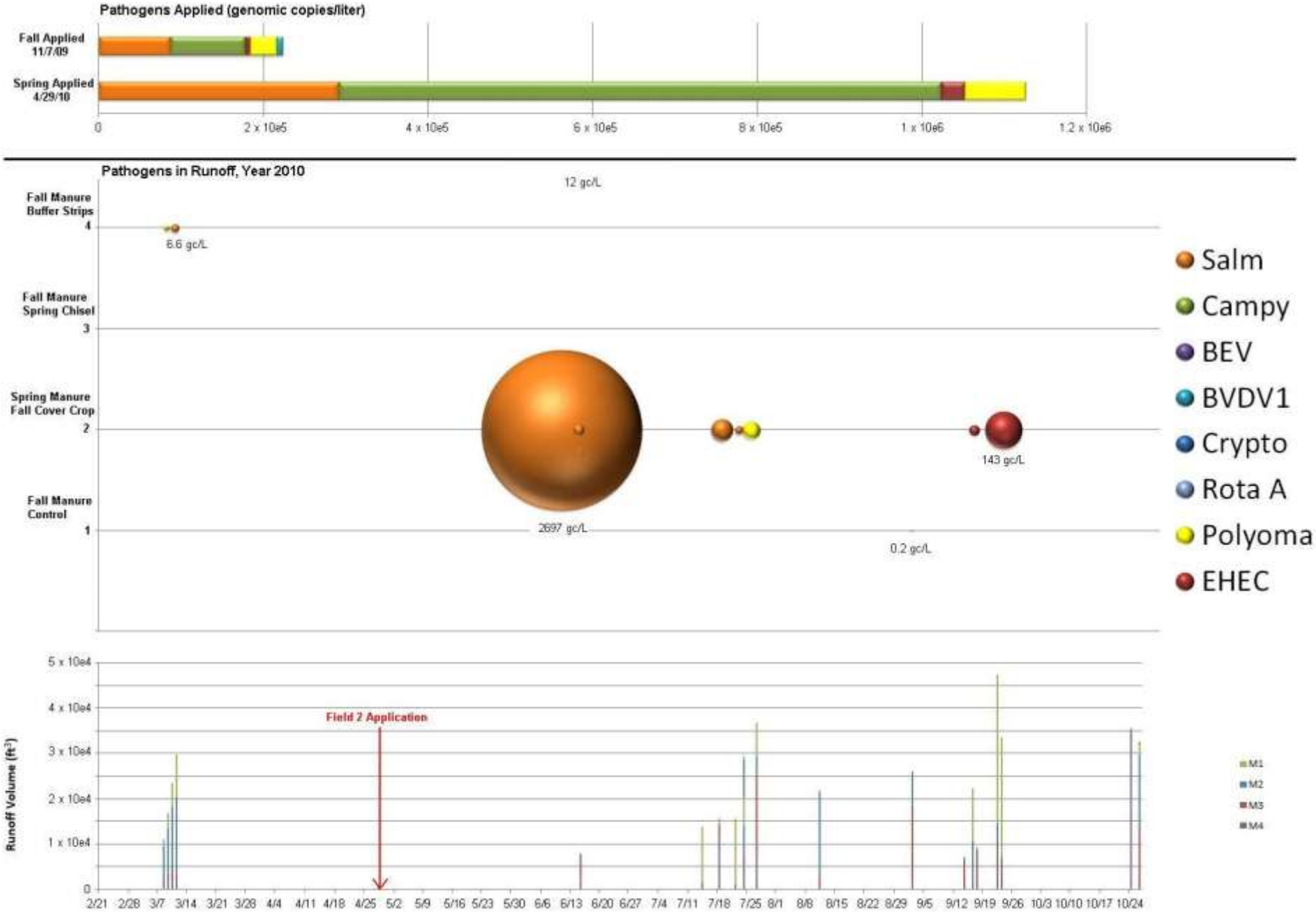
Daily 2 Inch Soil Temperature vs *E. coli* Log Concentration




Pathogens Applied (genomic copies/liter)
Fall Applied 11/6/08
Spring Applied 5/8/09
0
2 x 10e5
4 x 10e5
6 x 10e5
8 x 10e5
1 x 10e6
1.2 x 10e6
1.4 x 10e6


Pathogens in Runoff, Year 2009
Fall Manure Buffer Strips
4
Fall Manure Spring Chisel
3
Spring Manure Fall Cover Crop
2
Fall Manure Control
1
0.9 gc/L
11 gc/L
Campy
Corona
Salm
BEV
EHEC
Rota A


Runoff Volume (ft³)
8 x 10e4
6 x 10e4
4 x 10e4
2 x 10e4
0
Field 2 Application
2/10
2/17
2/24
3/3
3/10
3/17
3/24
3/31
4/7
4/14
4/21
4/28
5/5
5/12
5/19
5/26
6/2
6/9
6/16
6/23
6/30
M1
M2
M3
M4


Pathogens Applied (genomic copies/liter)
Fall Applied 11/7/09
Spring Applied 4/29/10
0
2 x 10e5
4 x 10e5
6 x 10e5
8 x 10e5
1 x 10e6
1.2 x 10e6
Pathogens in Runoff, Year 2010
Fall Manure Buffer Strips
Fall Manure Spring Chisel
Spring Manure Fall Cover Crop
Fall Manure Control
12 gc/L
6.6 gc/L
2697 gc/L
0.2 gc/L
143 gc/L
Salm
Campy
BEV
BVDV1
Crypto
Rota A
Polyoma
EHEC
Runoff Volume (ft³)
Field 2 Application
M1
M2
M3
M4

Madison Metropolitan Sewerage District (MMSD)
Biosolids Recycling and the Metrogro Program

Biosolids Production

MMSD provides wastewater treatment to villages, towns and cities surrounding the Madison area lakes. Septage from homes throughout Dane County is also transported to the District's Nine Springs Wastewater Treatment Plant for additional treatment. Wastewater treatment relies on both physical and biological processes that produce two end products: biosolids and highly treated effluent.

Biosolids produced at the Nine Springs Plant are recycled to agricultural land as a fertilizer and soil conditioner through the District's Metrogro Program. Other biosolids handling options (e.g. incineration and landfilling) were initially evaluated by the District. However, the general public overwhelmingly supported recycling biosolids to agricultural land as a fertilizer and soil conditioner. The Metrogro Program has received national recognition and is used as a model by EPA. Farmer interest in the program is very high, with demand for the product exceeding the supply.

Regulation of Biosolids Recycling Programs

Biosolids recycling practices are regulated by both the USEPA and the Wisconsin Department of Natural Resources. These regulations are designed to ensure that biosolids recycling is conducted in a manner that is protective of human and animal health and environmental quality.

The USEPA has established comprehensive risk-based regulations for biosolids recycling programs. These regulations are commonly referred to as the Part 503 Regulations. The first step in EPA's regulation development process was to conduct a screening process to identify those parameters that might require a more detailed regulatory response. In the screening process, EPA assumed conditions that would maximize the potential for exposure.

Parameters that were not screened out during the first step were subject to a comprehensive risk assessment process. This process included several steps. First, potential environmental pathways were identified. A pathway simply describes how a human, plant or animal could potentially come in contact with trace elements contained in biosolids. Fourteen different pathways were identified.

The next step in the risk assessment process involved assembling all of the available scientific information that pertained to the pathway and parameter of interest. For example, information on plant accumulation of trace elements (e.g. copper, selenium and zinc) was collected. As a final step, maximum acceptable loading rates (e.g. pounds of the trace element per acre) were calculated, with the rates being low enough to ensure that human, plant and animal health are adequately protected.

The EPA regulations also contain some general site management requirements. For example, they specify that annual biosolids application rates may not exceed the nitrogen

requirement of the crop grown. However, EPA recognized that individual states were better positioned to address regional and/or site specific issues through their state regulatory programs.

The EPA regulatory approach is flexible in that new parameters can be added as new information becomes available. In fact, EPA is required to periodically review existing regulations and to determine if additional parameters require a regulatory response.

The Wisconsin Department of Natural Resources regulates biosolids applications under chapter NR 204 of the Wisconsin Administrative Code. NR 204 contains the same risk-based limits that were developed by EPA and contains some additional management and recordkeeping requirements. For example, NR 204 specifies setback distances from wells and homes. A hard copy of the entire rule can be obtained by writing WDNR. An electronic copy can be found at http://www.legis.state.wi.us/rsb/code/nr/nr200.html. Please contact Fred Hageman or Bob Liska of the Wisconsin Department of Natural Resources if you have specific questions regarding NR 204.

Site Inspection and Approval

All farms receiving Metrogro applications are subject to a formal site approval process administered by the Wisconsin Department of Natural Resources. As part of the approval process, environmentally sensitive areas that may exist on the farm are identified (e.g. soils with excessive slopes or soils subject to flooding or ponding). Metrogro may not be recycled in these areas. The District maintains electronic maps in a GIS (geographic information system) for each farm in the Metrogro Program, with areas that Metrogro can be applied clearly shown. Maps are provided to field operators to ensure that Metrogro is applied to appropriate areas within a field.

Site Management

WDNR has specified standard setback distances from homes, wells and waterbodies as part of a standard set of management practices that must be followed. Metrogro may not be applied in these setback areas. Prior to recycling Metrogro at a site, all setback distances are marked out by placing orange flags in the field. In addition, environmentally sensitive areas are identified and marked using the flagging system. Although Metrogro can not be recycled in these areas, they are often worked up as a service to participating farmers. This is accomplished using the same equipment that is used to recycle Metrogro.

Metrogro Application

Metrogro is normally applied as a liquid (consisting of approximately 5% solids and 95% water) using specialized equipment that injects the biosolids approximately 8 to 10 inches beneath the soil surface. DNR regulations place a strong emphasis on nutrient management, particularly as it relates to nitrogen. Metrogro applications are based on meeting the nitrogen requirement of the crop grown. The nitrogen requirement is based on soil samples that are collected from each site on a routine basis and analyzed at the University of Wisconsin Soils and Plant Analysis Laboratory. Application rates are adjusted to account for other nitrogen sources that farmers may use on the same fields,

such as manure or commercial fertilizer. These practices are designed to protect water quality. Typical Metrogro application rates range from 1.5 to 2.0 tons of dry solids per acre, which supplies approximately 140-160 pounds of available nitrogen per acre. Metrogro is typically recycled to approximately 4,000-5,000 acres of farmland each year. Most of the farms participating in the Metrogro Program are located in Dane County, although a limited number are located in Rock, Jefferson Green and Columbia Counties.

While nitrogen has historically been the focus of nutrient management efforts, increased attention is being paid to phosphorus. For the past several years, the District has had a voluntary goal of not recycling Metrogro to the same field more frequently than once every three years. Although this is not a regulatory requirement, a three year return frequency brings phosphorus additions more in line with anticipated phosphorus removal over the crop rotation period. In practice, the District's return frequencies are often greater than 3 years.

As an additional step to address phosphorus, the District will be adding a phosphorus recovery step at the Nine Springs Wastewater Treatment Plant. This step should be in place by 2014, and is expected to decrease biosolids phosphorus concentrations by 40-50 percent.

Monitoring Programs

Metrogro samples are collected on a daily basis during the recycling season. These samples are then composited and analyzed on a routine basis for nutrients and trace elements. The Wisconsin Department of Natural Resources has established criterion for defined a "high quality" biosolids product on the basis of metal concentrations. Metrogro easily meets the WDNR definition of a high quality biosolids product.

The District also conducts a voluntary private well water monitoring program as part of the Metrogro Program. Wells in this program are sampled before Metrogro is initially applied to a site to document background conditions. These wells are then sampled on an annual basis. There are currently about 1,000 private wells that are part of the Districts well water monitoring program.

It is not unusual for wells located in rural areas of South Central Wisconsin to have a high nitrate-nitrogen concentration on a background basis due primarily because of long term farming practices. A detailed statistical analysis of the District's well water monitoring information by the UW-Madison, Department of Civil and Environmental Engineering has demonstrated that there is no apparent correlation between nitrate-nitrogen concentrations and Metrogro applications.

Recordkeeping

Each field that receives Metrogro has been assigned a unique identification number by the Wisconsin Department of Natural Resources. All application information is tracked to this identification number, allowing for an accurate site history to be maintained at all

times. The District maintains a very detailed database which contains information on biosolids quality, well water quality, site hauling/application history and metal loading information. Information on the site history for any farm participating in the Metrogro Program is available upon request.

Interaction With Other Agencies

The District works closely with outside agencies such as the Department of Natural Resources, EPA, Dane County Land Conservation Department, the Natural Resources Conservation Service and other groups to ensure that the Metrogro Program continues to operate in a safe and environmentally sound manner. The District also has an on-going relationship with the UW-Madison to conduct research necessary to address important issues relative to environmental quality.

Additional Information and Contacts

If you want to learn more about the District's biosolids management program or have questions, comments or suggestions about how we can improve any aspect of our Metrogro Program, please visit our website (www.madsewer.org) or contact Mike Northouse (608-222-1201, ext. 256; email: miken@madsewer.org).

- Information on the EPA biosolids management program can be found on the internet www.epa.gov/owm/mtb/biosolids/htm**.**

- The National Biosolids Partnership website (http://www.wef.org/biosolids/) contains a wealth of information regarding biosolids management.

- General questions regarding the Wisconsin Department of Natural Resources approach to regulating biosolids can be directed to Fred Hegeman at 608-267-7611 (email: frederick.hegeman@wisconsin.gov) or Bob Liska 608- 275-3288 (email: robert.liska@wisconsin.gov).

- Questions or concerns related to biosolids and health issues can be directed to John Hausbeck at the Public Health Department of Madison/Dane County. Mr. Hausbeck can be reached at (608)-243-0331 (email: jhausbeck@publichealthmdc.com).