

**A summary of laws and regulatory / non-regulatory programs related to agricultural chemicals in groundwater in USA**

Mike Wireman  
National Ground Water Expert - US EPA Region 8  
Chair- US Chapter – International Association of Hydrogeologists

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**GROUNDWATER SUSTAINABILITY**

- Sufficient **quantity** for beneficial use
- Suitable **quality** for beneficial use

**What is the water quality issue?**

- CONTAMINATION OF WATER RESOURCES / FOOD BY AGRICULTURAL CHEMICALS - PRIMARILY PESTICIDES AND NUTRIENTS
- Approximately 20,000 **PESTICIDE** products registered for use in the USA
- Approximately 12 million tons of **NITROGEN** applied by US farmers as fertilizer in 2000
- More than 200,000 **Animal Feeding Operations** in USA– AFOs and CAFOs
- Environmental issues
  - ◆ Pesticide toxicity -humans and animals
  - ◆ Nitrogen
    - Drinking water – methemoglobinemia (blue baby), bladder & ovarian cancer
    - Nutrient loading to surface waters - hypoxia, eutrophication
    - Mobilization of selenium by nitrate

**WORLD AND USA AMOUNT OF PESTICIDE USE (ACTIVE INGREDIENT)**

TYPE	WORLD MARKET		US MARKET		USA % OF WORLD MARKET
	MILLION LBS. OF A.I. <sup>2</sup>	%	MILLION LBS. OF A.I.	%	
<b>YEAR 2001</b>					
Herbicides <sup>3</sup>	1870	37	553	46	30
Insecticides	1232	24	105	9	9
Fungicides	475	9	73	6	15
Other <sup>4</sup>	1469	29	472	39	32
<b>Total</b>	<b>5046</b>	<b>100</b>	<b>1203</b>	<b>100</b>	<b>24</b>

1. Source – EPA estimates based on Croplife America annual surveys, USDA/NASS & EPA proprietary data
2. A.I. = active ingredient
3. Includes herbicides & plant growth regulators
4. Includes nematicides, fumigants, rodenticides, molluscicides, aquatic & fish /bird pesticides plus other chemicals used as pesticides (oil, sulfur)

**Primary Laws & Regulations**

**PESTICIDES**

- FIFRA - Federal Insecticide, Fungicide and Rodenticide Act
  - Regulates pesticide distribution, sale and use
- FFDCa – Federal Food, Drug & Cosmetic Act
  - Establishes pesticide tolerances for food / feed
- PRIA – Pesticide Registration Improvement Act
  - Increased type and amount of information
- FQPA – Food Quality Protection Act
  - Set tougher standards for food products –cumulative
- ESA –Endangered Species Act
  - To implement FIFRA in a way that ensures compliance with the requirements of the ESA mandate to protect listed species.

**Primary Laws & Regulations**

**PESTICIDES**

- FIFRA
  - EPA responsible for registering / licensing pesticide products
    - applicant must show that using the pesticide according to specifications “will not generally cause unreasonable adverse effects on the environment”
  - Requires strict adherence to label directions – use not in accordance with label directions is subject to civil & criminal penalties
  - FIFRA regs implemented by State Departments of Agriculture

## NPDES Pesticide General Permit

- June 4, 2010 EPA public noticed a rule that requires NPDES permit for all biological pesticide applications and chemical pesticide applications that leave a residue in water when such applications are made in or over, including near, waters of the US
  - Mosquito & other flying insect control
  - Aquatic weed / algae control
  - Aquatic nuisance animal control
  - Forest canopy pest control
- Final rule –Dec 2010 - Will take effect in April 2011
- EPA estimates that the PGP will affect 35,000 pesticide operators nationally that perform about 500,000 pesticide applications annually

## Nutrients – Agricultural Sources

Nitrogen Fertilizers



42-17770997 fotosearch.com

Animal feeding operations



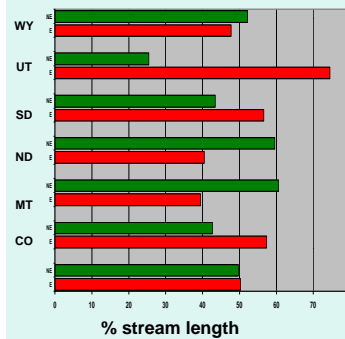
## Why are nutrients important?

- 10,000+ 303(d) listings = third largest cause of impairment
- Over half (80) of U.S. estuaries suffer harmful low oxygen events
- 49 states have section 303(d) listings for nutrients or excessive algal growth.
- Over 5,000 completed TMDLs for nutrients, oxygen depletion, or excessive algal growth



**OST<sub>9</sub>**

## What is the problem?



Red –exceeds reference site values  
Green – does not exceed

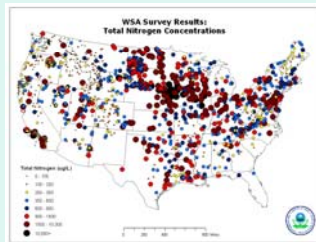
- Since 2003 69 PWS systems in EPA Region 8 violation of nitrate MCL (63 are ground water systems)
- Excessive nutrients leads to problems for drinking water treatment:
  - Algal and moss growth
  - Taste, odor, color and treatment problems
  - Possible health effects from algal toxins
  - Bacterial and other aquatic life
  - Excessive organic matter = disinfection byproducts

## Nutrient Impacts to Water Resources



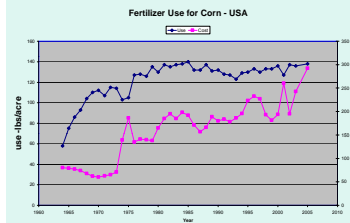
Hypoxia Areas Have Increased Dramatically over the Last 50 Years

Source: [Science/World Resources Institute](#).

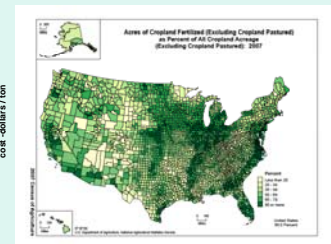


EPA Wadeable Streams Assessment

## Fertilizer use in USA



Source –USDA Economic Research Service



1945 -2001 - Total nitrogen input from fertilizer and manure in USA increased from < 500,000 to approx. 11million kg / year (Alexander & Smith, 1990 and Ruddy et al., 2006)

# Primary Laws & Regulations

## FERTILIZERS / NUTRIENTS

- **Fertilizer use is NOT regulated**
  - Most widespread ground water contaminant in US
  - Application of fertilizers is most common & widespread source
  - Nitrate concentrations in GW in major agricultural areas has increased in past 2 decades
- **AFOs / CAFOs**
  - Some CAFOs subject to regulation under CWA – NPDES
  - EPA currently promulgating new CAFO rule
  - Some states have additional regs

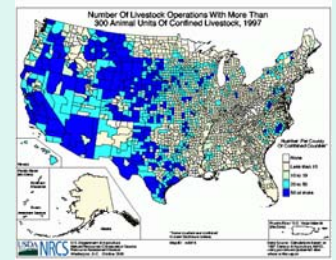
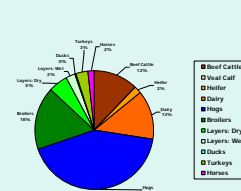
# AFOs / CAFOs

- **Animal Feeding Operation**
  - (approx. 240,000 in USA)
  - Confines animals for 45 days in 12 months
  - Sustains no vegetation in confinement area
- **Concentrated Animal Feeding Operation**
  - Approx. 20,000 in USA
  - Large
  - Medium



Animal Type	Large CAFO	Medium CAFO
Dairy cows	700	200-699
Veal Calves	1000	300-999
Beef Cattle	1000	300-999
Swine	2500 (55 lbs / more) 10,000 (< 55 lbs)	750-2499 3000-9999
Horses	10,000	150-4999
Sheep /lambs	10,000	3000- 9999
Turkeys	55,000	16,5000 - 54,999
Chickens liquid manure	30,000	9000 – 29,999
Chickens other	82,000 (laying) 125,000 (non-laying)	37,500 – 124,999 25,000 – 81,999
Ducks liq. Manure non-liquid	5000 30,000	1500 – 4999 10,000 – 29,999

# CAFOs in USA



U.S. Distribution of CAFOs by Animal Sector

Estimated Total CAFOs in U.S.: 20,000

# CAFO Rule History

- 1972 → Congress enacts the CWA
- 1974/1976 → EPA establishes first effluent limitation guidelines and permit regulations for CAFOs
- February 2003 → EPA issues revised CAFO regulations
  - > requires NPDES permits for all CAFOs – unless no discharge
  - > requires nutrient management plans
- February 2005 → 2<sup>nd</sup> Circuit court of Appeals Decision in Waterkeeper v. EPA – court vacated 2003 rule
- June 2006 → Proposed rule published to address Waterkeeper decision
- March 2008 → Supplemental proposed rule with additional options
- November 2008 → CAFO rule revisions published in FR
- 2010 → EPA sued by Environmental groups & industry Settlement discussions underway

# Major Rule Requirements

- All CAFOs that Discharge or Propose to Discharge Must Apply for permit (no discharge)
- Nutrient Management Plan Required
- Manure Transfer Record Keeping
- Technical Standards developed by the Director for Nutrient Management



## How many operations will be regulated?

- Estimated 11,000 CAFOs will require NPDES permits
  - (9000 currently have permits)
- A limited number of small facilities may be designated
- EPA believes these CAFOs produce 300 million tons of manure annually
- Focusing on CAFOs, covers 60% of manure generated at all AFOs by regulating only 8% of AFOs



## State regulation of ag chemicals

- BMPs
- GW classification
- GW Monitoring
- CAFO regulation
  - Monitoring
  - Lined containment ponds

## Best Management Practices

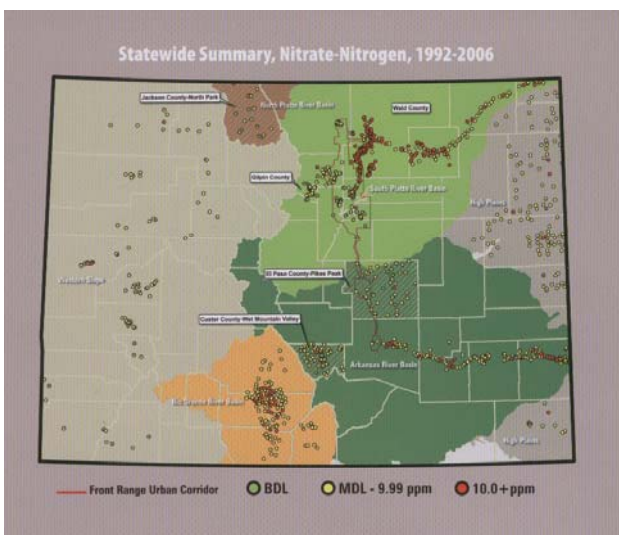
- Conservation tillage
- Crop nutrient management
- Pesticide management
- Conservation buffers
- Irrigation management
- Grazing management
- AFO management plans
- Erosion /sediment control



## BMPs

- Are they effective for reducing nitrogen loading? If not –why?
- Poor design? Poor implementation?
- NRCS– Conservation Effects Assessment Program (CEAP)
  - Multi-agency effort to quantify environmental effects of conservation practices and programs
  - Develop science base for managing agricultural landscape for environmental quality
  - National, regional and watershed scale

Statewide Summary, Nitrate-Nitrogen, 1992-2006



## Hydrogeologic susceptibility

- Some aquifers highly susceptible to NO<sup>3</sup> contamination

**Coarse sand and gravel aquifer**  
**Shallow depth to water (<20 feet)**

In some hydrogeologic settings nitrate contamination of groundwater cannot be prevented by BMPs

## Solutions?

- **MUST** limit non-point source loading to groundwater – increased regulation?
- **Numeric** vs. narrative nutrient standards
- **MUST** improve groundwater monitoring in agricultural areas
- Incorporate differential management concepts – recognize hydrogeologic constraints
- Need better science re: groundwater contribution of total maximum daily loads (TMDLs)
- Evaluate and improve BMPs

## Solutions?

- EPA Nutrient Initiative
- EPA HQ and Regional offices are currently developing an effort to work with States and agricultural community to address nutrient contamination of surface and groundwaters
- Gain common understanding of problem

**Thank you!**

**Mike Wireman**

**US EPA**

**Wireman.mike@epa.gov**

