REMEDIATION ROUNDTABLE

June 21, 2016

Connecticut Department of Energy and Environmental Protection

www.ct.gov/deep/remediationroundtable

Agenda

Transformation Update

Wave 2 RSR Progress Update

PCBs: Commonly Asked Questions

Survey Results on Emerging Contaminants

Emerging Contaminants Update

Proposed Amendments to Environmental Use Restriction Regulations

Website Updates

New additions to the Website:

- RSR Wave 2:
  - Concept Language *(April 5)*
  - Public Comments *(June 1)*
- Volatilization Discussion Document *(May 6)*
- finalized Verification Forms *(coming soon)*
- RSR training slides *(April 7 EPOC)*
- U.S.EPA Funding for Brownfields Area Wide Planning Grants available *(proposals due by August 10, 2016)*

Announcements

- Pilot test for Webcasting at October 25 Roundtable with WebEx

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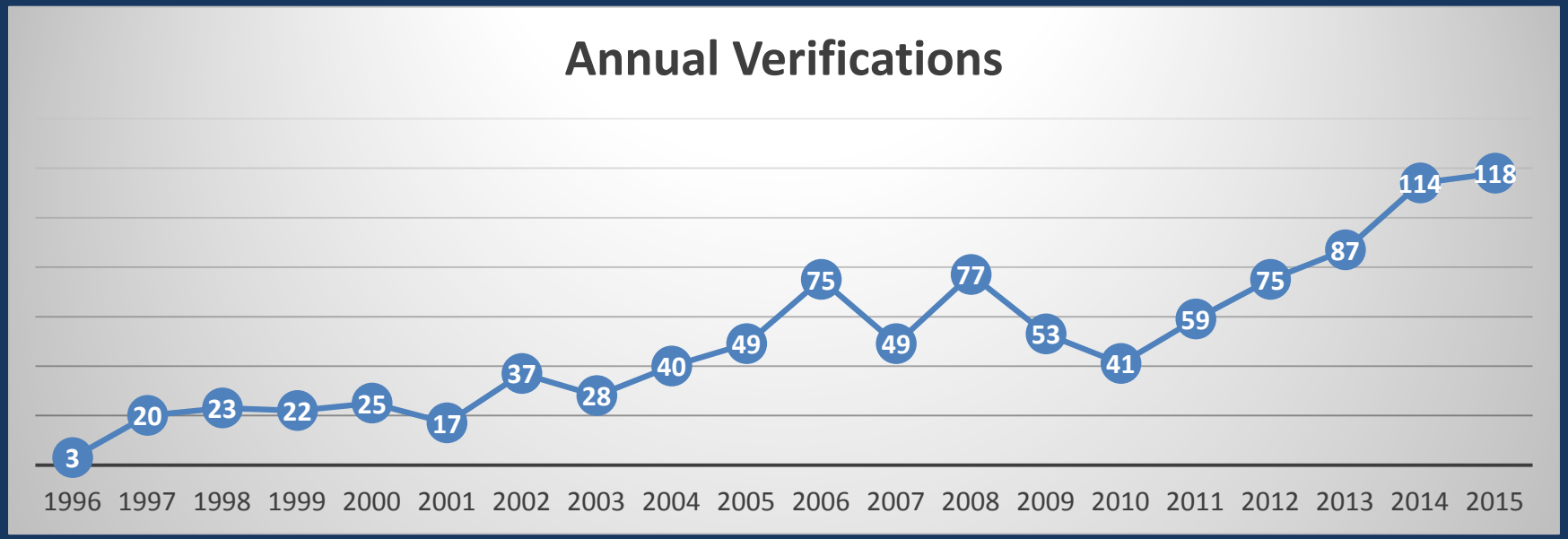
SEH Program Metrics

SEH Type	Year Before (7/1/14-6/30/15)	Year After (7/1/15 - 6/14/16)	Post-July 1, 2015 Remarks
Supply Well > Action Level	1	8	1 due to NAPL presence
Supply Well < Action Level	3	2	
Plume near Supply Well	16	18	
Volatilization Threat	2	1	Not affected by law change
Direct Exposure Surface Soil	5	11 (one in error)	None affected by law change
Surface Water Threat	3	6 (one in error)	2 due to NAPL presence
Total	29 discrete locations	40 discrete locations	

Verification Metrics

- Verification stats – 34 since January 1, 2016



- 25 No Audit letters issued in 2016

Announcements

- CT DEEP GreenCircle Sustainability Award incorporates concepts such as Green Remediation into its eligibility determinations

- Awarded to Pfizer for their green and sustainable remediation at Pharmacia Upjohn in North Haven
  - First site ever for GSR

CT DEEP GreenCircle Award

Pharmacia/Upjohn Case Study in Green Remediation

December 8, 2015 Roundtable Presentation

Guidance for Green Remediation in Connecticut

- more sites involved in GSR
- nominations for the GreenCircle Award due February
- DEEP.remediationroundtable@ct.gov

Questions / Comments

Please speak loudly.

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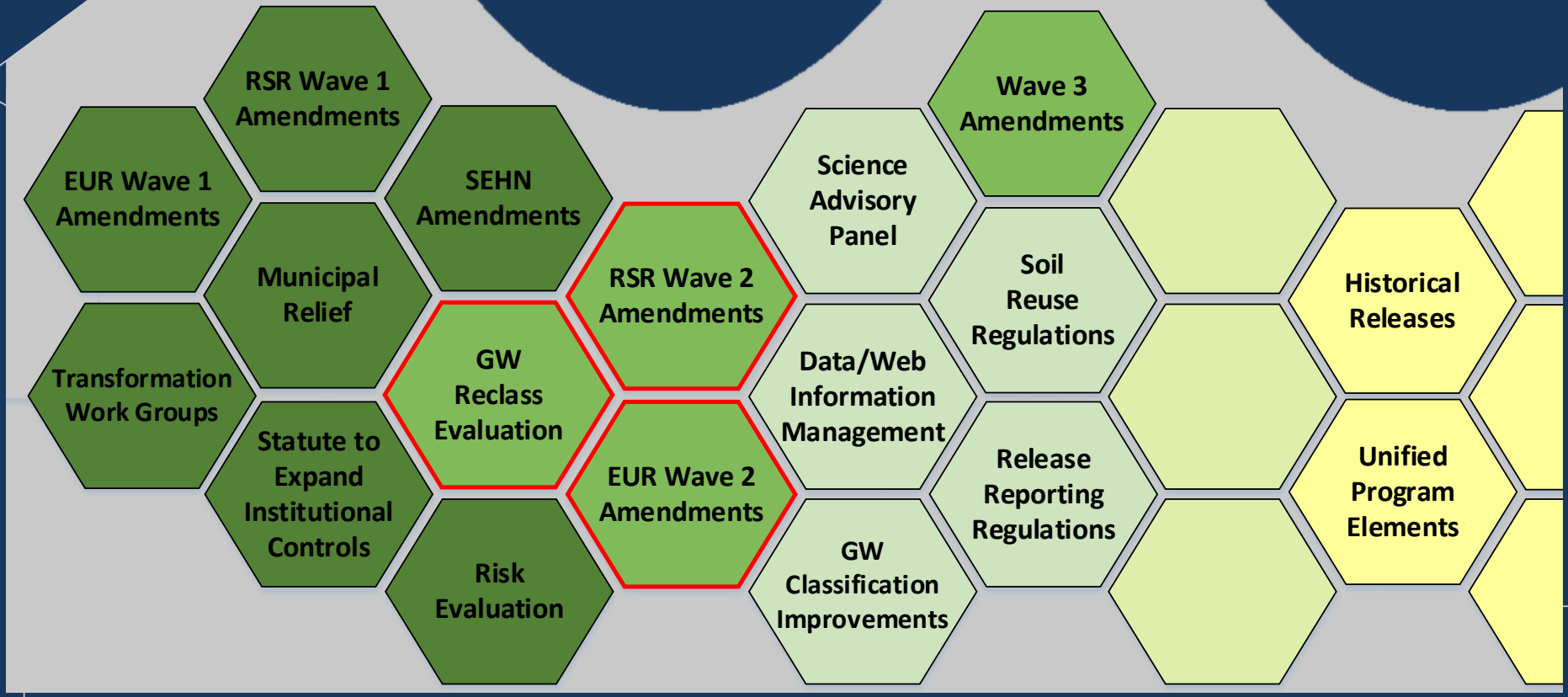
Transformation Update

Jan Czeczotka
Remediation Division
Assistant Director

Transformation Process is Evolving...



Questions / Comments

Please speak loudly.

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Wave 2 RSR Progress Update

Kevin Neary
Remediation Division
Environmental Analyst 3

Public Comments

- RSR Wave 2 Conceptual Language released on April 5, 2016

- Public Comment Document posted on June 2, 2016
  - Compilation of all written comments as of May 6, 2016
  - Comments separated by topic

✓ Comments are being used to improve the formal proposed regulations

Public Comments

- Structure:
  - Proposed DEEP language remains red and underlined
  - Proposed DEEP deleted language remains [blue and bracketed]
  - Commenter's suggested added language is green and underlined
  - Commenter's suggested deleted language is [blue, bracketed] and ~~strikethrough~~

Fate and Transport Interim Update for Volatilization Criteria

- Discussion Document provides two scenarios for modify the Volatilization Criteria

  Option 1: Use 1996 TAC with updated 2003 fate and transport

  Option 2: Uses 2003 TAC with updated 2003 fate and transport

- Received only a few comments on discussion document

- Potential to incorporate Option 2 into Wave 2

Next Step

- Continue to evaluate the comments for potential modifications to the proposed RSR language (June)

- Generate a Modified Conceptual Language document (July)
  - Will only contain concepts that are being edited
  - Will follow the color scheme of the Public Comment Document
  - Will have two types of edit structure
    - Small edits will be represented directly in original proposed language
    - Larger edits will have the original proposed language along with the new proposed language

Next Step

- Internal DEEP and Commissioner review (August)
- Start formal adoption process (September/October)
  1. Public Notice of Intent to Secretary of State
  2. Public Hearing
  3. Hearing Officer's Report
  4. Final proposed regulations to the Commissioner
  5. DEEP notification to all interested parties of availability of final wording
  6. Final proposed regulations to Attorney General for Legal Sufficiency approval
  7. Final proposed regulations to Office of Fiscal Analysis and Environment Committee
  8. LRRC hold meeting on regulatory amendments per CGS section 4-170
  9. Regulations filed with Secretary of State per CGS section 4-172 (Regulations final upon filing)
  10. Publication of Regulations in the CT Law Journal

Questions / Comments

Please speak loudly.

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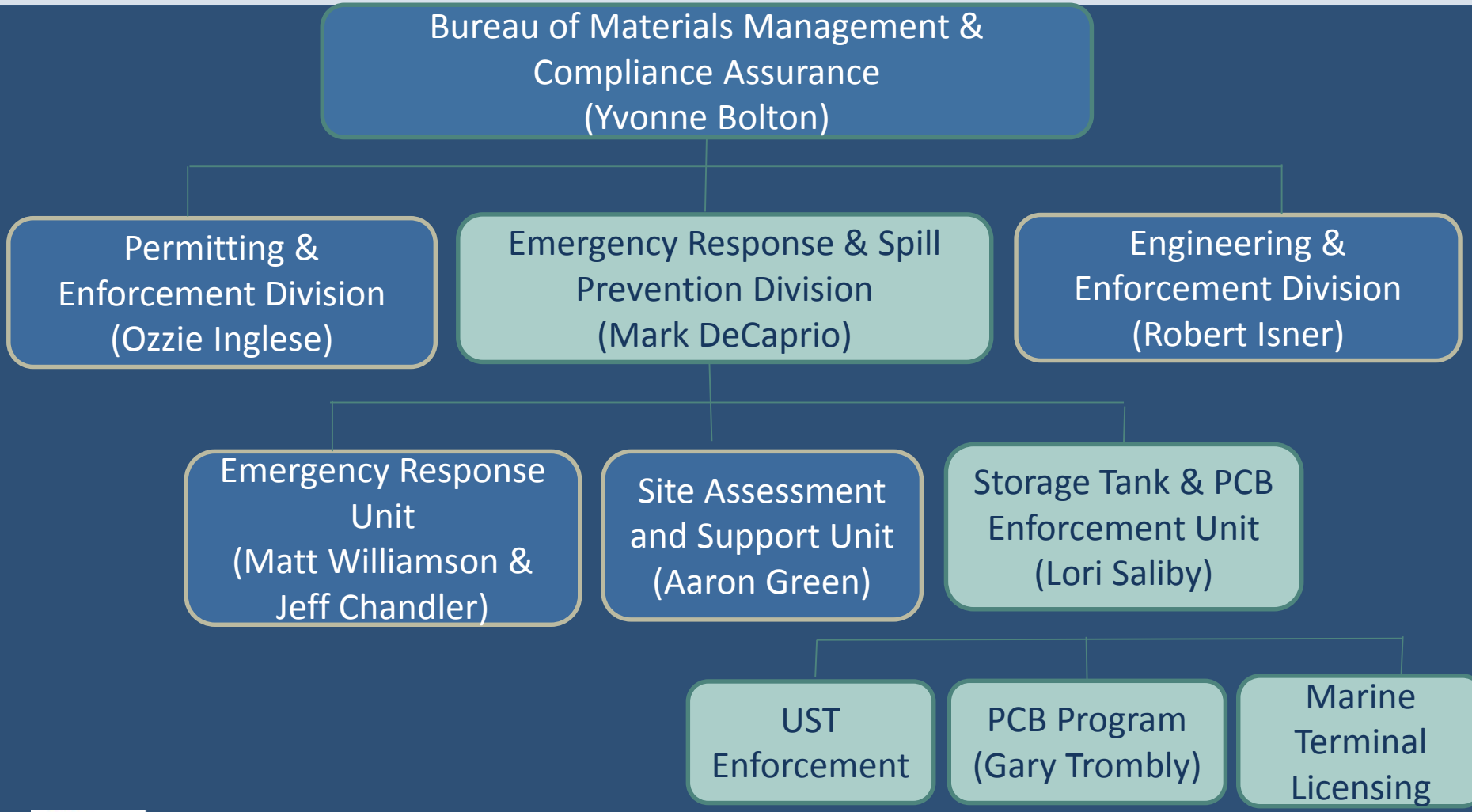
PCBs: Commonly Asked Questions

Lori Saliby
Materials Management and Compliance Assurance
Storage Tank and PCB Division
Supervising Environmental Analyst

Organization



PCB Program Staff

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Connecticut PCB Program

- Not delegated
- Act as agents for EPA to assess compliance with federal requirements through a contract with EPA – issued federal credentials
- Act also as agents of the Commissioner of DEEP to assess compliance with state requirements including CGS 22a-463 through 22a-469a
- Sites must meet both EPA requirements and DEEP requirements including RSRs and statutes

Frequently Asked Questions

- Is there a particular concentration or PCB threshold I should be aware of?
  - Prior to the determination of any threshold, at a minimum, the following must be taken into account if PCBs are detected at any concentration;
  1. All efforts must be made to determine the original PCB source and the original source concentration.
  2. What is the future use of the location?
  3. Is it a PCB Remediation Waste by definition in TSCA?

What is a TSCA PCB Remediation Waste?

- Waste containing PCBs as a result of a spill, release, or other unauthorized disposal that are currently at concentrations >50ppm PCBs regardless of the concentration of the original spill and materials which are currently at any concentration if the PCBs are spilled or released from a source not authorized for use.

✓What is an authorized use? (Find out at 40CFR761.30)

(examples: authorized = transformer, unauthorized = paint)

How do I address PCB Remediation Waste?

1) Notification under federal Self-Implementing (40CFR761.61(a))

2) Performance-based (40CFR761.61(b))

3) Risk-based (40CFR761.61(c))

How do I address PCB Remediation Waste?

1) Notification under federal Self-Implementing

- Not really self-implementing at all
- Notification under federal Self-Implementing should be made to Kim Tisa, Gary Trombly & the locality.
- Prescriptive requirements for sampling
- Can dispose at 'as found' concentration if sampled in situ and surgically removed (no mixing, no stockpile sampling)
- Can leave up to 100 ppm under compliant/approved cap

How do I address PCB Remediation Waste?

2) Performance-based (40CFR761.61(b))

- Does not require federal notification/approval
- Must remediate to the most stringent federal standard (1ppm)
- ALL material generated MUST go to the most stringent disposal facility (PCB incinerator or PCB landfill)
- No ability to deal with 'as found' disposal options

How do I address PCB Remediation Waste?

3) Risk-based (40CFR761.61(c))

- requires federal approval
- may require DEEP review of risk assessment/eco-risk assessment

What needs to go into a risk assessment for EPA under Risk-based Disposal?

Each application must include:

- ✓ Information described in the notification required by Self-implementing Disposal (next slide)
- ✓ Documentation showing why the proposal will not present a risk
- ✓ EPA may request any other information that it believes necessary to evaluate the application

No person may conduct cleanup activities under provision without obtaining prior written approval from EPA.

What needs to go into a risk assessment for EPA under Risk-based Disposal?

- ✓ Each application must include information described in the notification required by Self-implementing Disposal:
  - the nature of the contamination
  - a summary of the procedures used to sample, a table, site map showing PCB concentrations in pre-cleanup characterization samples
  - the location and extent of the identified contaminated area, including topographic maps with sample collection sites cross referenced to the sample data
  - a cleanup plan for the site, including schedule, disposal technology, and approach, options and contingencies for unanticipated higher concentrations or wider distributions of PCBs
  - a written certification, signed by the owner of the property and the party conducting the cleanup, that all work, including laboratory procedures were in accordance with the regulation

Frequently Asked Questions

- If total PCBs by aroclor is < 1mg/kg do I have to run SPLP?
  - No. If PCBs are <1 mg/kg, testing by TCLP/SPLP is not required to comply with the PMC

Waste that is not a PCB Remediation Waste

- Per CGS, it does not matter whether PCB contamination meets the definition of a federal PCB Remediation Waste

- It is still subject to Connecticut requirements

★ PCB >1ppm is subject to Connecticut requirements ★

(CGS 22a-463)

CT Remediation Standard Regulations

Direct Exposure Criteria (DEC)

- Residential – 1ppm (For federal – it is Residential/Commercial)
- Industrial/Commercial – 10ppm (For federal it is Industrial (restricted access))
- Only substance with criteria for inaccessible soil (10ppm)
- Contrast with federal high & low occupancy; remedial option
  - High Occupancy =
    - In and under a building or other location where a person is for 6.7+ hours/week

DEC Inaccessible Soil (22a-133k(a)(28))

- More than four feet below surface
- More than two feet below 3-inch paved surface
- Beneath an existing building
- Beneath other permanent structure approved by the commissioner

CT Remediation Standard Regulations

Electrical Substations

- Unlabeled 25ppm
- Properly Labeled 50ppm

Other Restricted Access (non-substation) locations

- As defined by 40 CFR 761.123
- Must also meet the definition of a residential/commercial area as stated in the definition of the other restricted access location.
- 10ppm in soil with ELUR
- 25ppm if rendered inaccessible

CT Remediation Standard Regulations

Pollutant Mobility Criteria

- GA PMC - 0.5ppb (SPLP)
- GB PMC – 5.0ppb (SPLP)

Groundwater Protection Criteria

- GA Groundwater 0.5ppb

Sediments

- Clean-up Levels are site/ecosystem specific – EPA approval needed

Frequently Asked Questions

- How do I know when a PCB issue needs involvement beyond the CT DEEP Remediation Division?

  ✓ If it is subject to federal jurisdiction;

  ✓ If it involves media not subject to the RSRs;
  - Building materials;
  - Equipment;
  - Sediments, surface water;
  - Paved surfaces – concrete, asphalt;
  - Clothing, persons, animals;
  - Releases that are not historic (even if at a brownfield, TA site, VR site)

Frequently Asked Questions

- How would building materials actively leaching to the environment be handled?

  ✓Under the federal PCB regulation, PCBs are not allowed in building materials;

  ✓The building materials would need to be removed and properly disposed, and the impacted environmental media cleaned in accordance with EPA and DEEP standards.

Frequently Asked Questions

- When can impacted materials be reused?
  - Under the federal PCB regulation, PCBs are not allowed to be used at any concentration in a manner that is not a totally enclosed manner

    (Exceptions, Use Authorizations and Prohibitions are spelled out in 40CFR761)
  - Non totally enclosed uses require annual DEEP authorization
  - Use as off-site fill of any federally-regulated material is prohibited
  - On-site disposal is allowed under Self-implementing & Risk-based with EPA approval and appropriate state mechanism (ELUR/ECV)

Frequently Asked Questions

- Does a fence satisfy the requirements of SEH for PCBs in surface soil?
  - The SEH condition can be considered mitigated ("controlled") with fencing and signage of the fully-delineated area of the hazard condition, notification of site workers, and annual reporting of mitigation measures. Federal regulations require ML marking of the area as well.
  - SEH mitigation is not a permanent remedy pursuant to state or federal PCB requirements.
  - State and federal requirements would compel that the PCBs be fully remediated in accordance with both the federal regulation, state statute and the RSRs, as applicable.

For More Information on PCBs in Building Materials

Hazardous Waste Advisory Committee website has presentations on this topic presented at their latest meeting 6/16/2016

http://www.ct.gov/deep/cwp/view.asp?a=2718&q=425388&deepNav_GID=1967

Questions / Comments

Please speak loudly.

www.ct.gov/deep/remediationroundtable

Survey Results on Emerging Contaminants

Shannon Pociu
Remediation Division
Environmental Analyst 3

Survey Results on Emerging Contaminants

- 61 people participated in the survey!
- 93% responded that they would be interested in hearing presentations on emerging contaminants as a future Remediation Roundtable topic
- 36% responded that they/their firm were researching emerging contaminants:
  - 79% 1,4-Dioxane
  - 63% PFASs (per- and polyfluorinated alkyl substances)
  - 63% Perchlorate
  - 46% Pharmaceuticals and personal care products
  - 38% Nanomaterials

Survey Results on Emerging Contaminants

- 54% responded that they evaluate whether any emerging contaminants are constituents of concern at remediation sites
- 50% responded that they test for emerging contaminants in site characterization
- 19% responded that they had developed or requested Additional Polluting Substance criteria for emerging contaminants

Emerging Contaminants

Contaminant	Where are they found?	Method for Analysis/Media
1,4-Dioxane	• Associated with chlorinated solvent contamination • Stabilizer for TCA, possibly other chlorinated solvents • Cellulose acetate membrane filters • Laboratories • Textiles • Paint strippers, dyes, greases, varnishes and waxes • Byproduct of PET plastic, ethoxylated surfactant, and antifreeze production	• EPA Method 522 – drinking water • Modified EPA Method 8260 or 8270 with SIM • Completely soluble • Leaches readily from soil to groundwater and migrates rapidly
PFASs (per- and poly-fluorinated alkyl substances)	• Firefighting foams (AFFF) • Airports, crash sites • Fire training areas • Used for water, oil, and stain repellency in textiles, carpets, and leather • Paper coating & food containers • Used in chrome plating	• EPA Method 537 ver. 1.1 – drinking water • ASTM D7968-14 and D7979 -15 • Mobile, persistent • Longer chains remain in soil longer than shorter chains • Possible deposition of airborne emissions → GW

Contaminant	Where are they found?	Method for Analysis/Media
Perchlorate	• Military sites – ammunition & rocket fuel • Associated with nitrates and explosives, solvents or metals • Pyrotechnics (fireworks), grenades, signals and flares, black powder and airbag initiators	• EPA Methods 314/331/332 for water • EPA SW-846 Methods 6850/6860
		• Sample both surface and deep soil and test adjacent surface and groundwater
Nanomaterials	• Used in manufacture of sunscreens, cosmetics, sporting goods, stain resistant clothing, tires and electronics • Medical diagnosis, imaging and drug delivery	• Varied
		• Migrates with groundwater and accumulates in soil, surface water and groundwater
PPCPs (Pharmaceuti-cals and personal care products)	• Lotions and creams, fragrances, cosmetics • Insect repellants • OTC pharmaceuticals and prescription pharmaceuticals • Medical care facilities	• EPA Method 1694
		• Sample multiple mediums and locations due to different chemistries and migration patterns

Resources

EPA Websites

CLU-IN https://clu-in.org/contaminantfocus/

Emerging Contaminants & Federal Facility COCs https://www.epa.gov/fedfac/emerging-contaminants-and-federal-facility-contaminants-concern

Drinking Water Health Advisories for PFOA & PFOS – May 2016

https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos

Fact Sheet on 1,4-Dioxane https://www.epa.gov/sites/production/files/2014-03/documents/ffrro_factsheet_contaminant_14-dioxane_january2014_final.pdf

Research on Nanomaterials https://www.epa.gov/chemical-research/research-nanomaterials

USGS Emerging Contaminants in the Environment Investigations
http://toxics.usgs.gov/regional/emc/index.html

Resources (cont.)

MassDEP Emerging Contaminants
http://www.mass.gov/eea/agencies/massdep/toxics/sources/emerging-contaminants.html

SERDP-ESTCP https://www.serdp-estcp.org/Tools-and-Training

ASTSWMO Information Paper on PFOA & PFOS
http://astswmo.org/files/policies/Federal_Facilities/2015-08-ASTSWMO-PFCs-IssuePaper-Final.pdf

Scientific Guidance Panel Biomonitoring California: Perfluoroalkyl and Polyfluoroalkyl Substances
http://biomonitoring.ca.gov/sites/default/files/downloads/PotenDesigPFASs_031315.pdf

National Institutes of Health: Nanomaterials
http://www.niehs.nih.gov/health/topics/agents/sya-nano/

Survey Results on Emerging Contaminants

Thank you!

- ✓ To everyone who participated in the survey.
- ✓ To those who offered to share their expertise.

Next steps:

- Future Roundtable presentations
- Develop web content/resources
- Workgroup on emerging contaminants??

DEEP.remediationroundtable@ct.gov

Questions / Comments

Please speak loudly.

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Tracking and Evaluating Emerging Contaminants

Gary Ginsberg

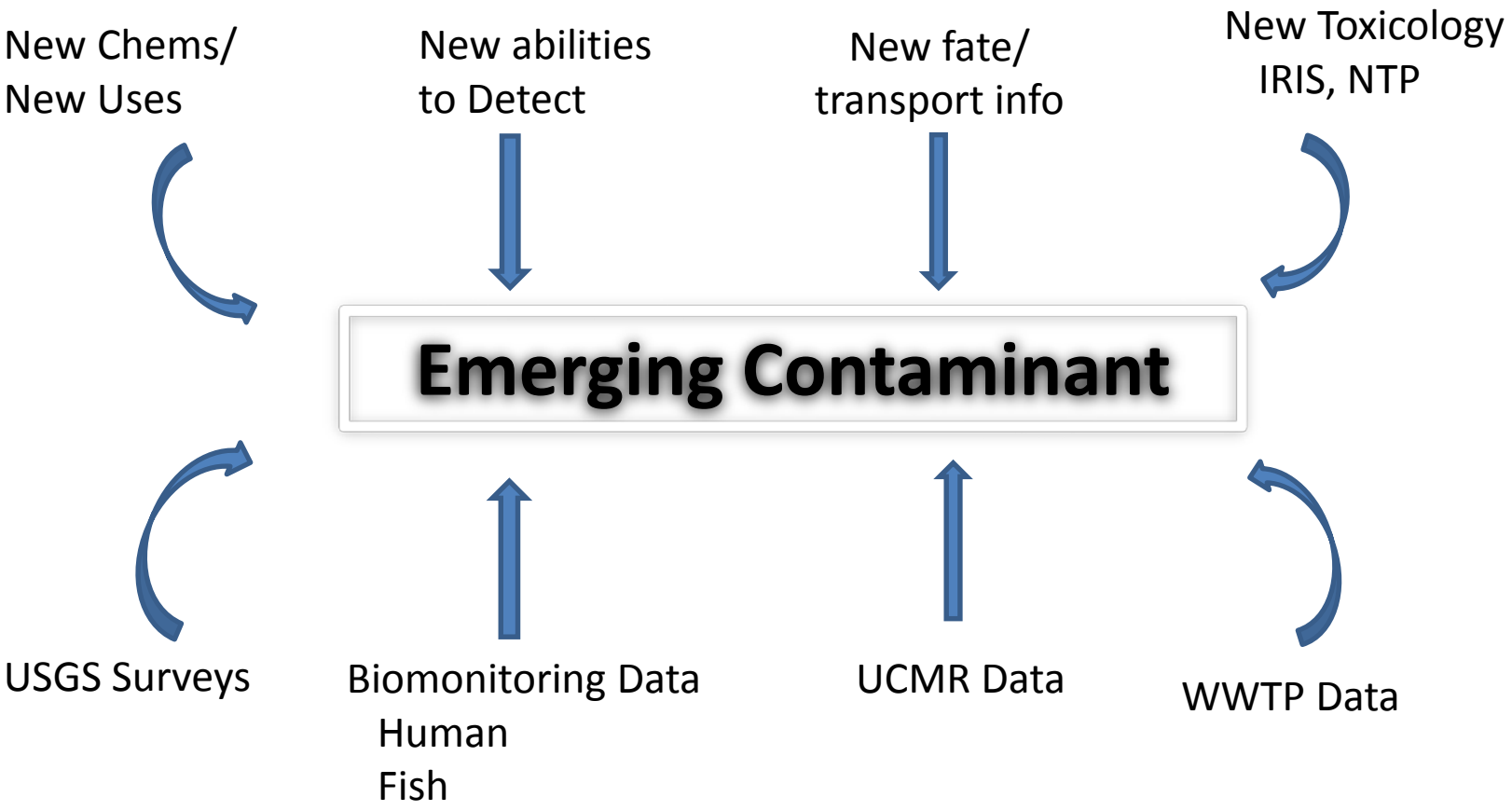
Connecticut Department of Public Health

Roundtable Presentation: June 21, 2016

Outline

1. Reasons Chemicals “Emerge” and How They Come to Light
2. Media Affected and Examples
   - Groundwater, surface water, air, house dust, FISH
3. Challenges presented (analytical, toxicology, sources, surveillance and prediction, regulatory issues)
4. Specific Examples
   - 1,4-dioxane, MtBE
   - PFAS – groundwater, fish, toxicology, more than just PFOS/PFOA
   - Perchlorate
   - Algal toxins
   - PPCPs
   - Plasticizers
   - Flame Retardants
   - Pesticides
   - Nitrate
5. Summary: How to keep up with the curve

Reasons Chemicals Emerge



GARY GINSBERG

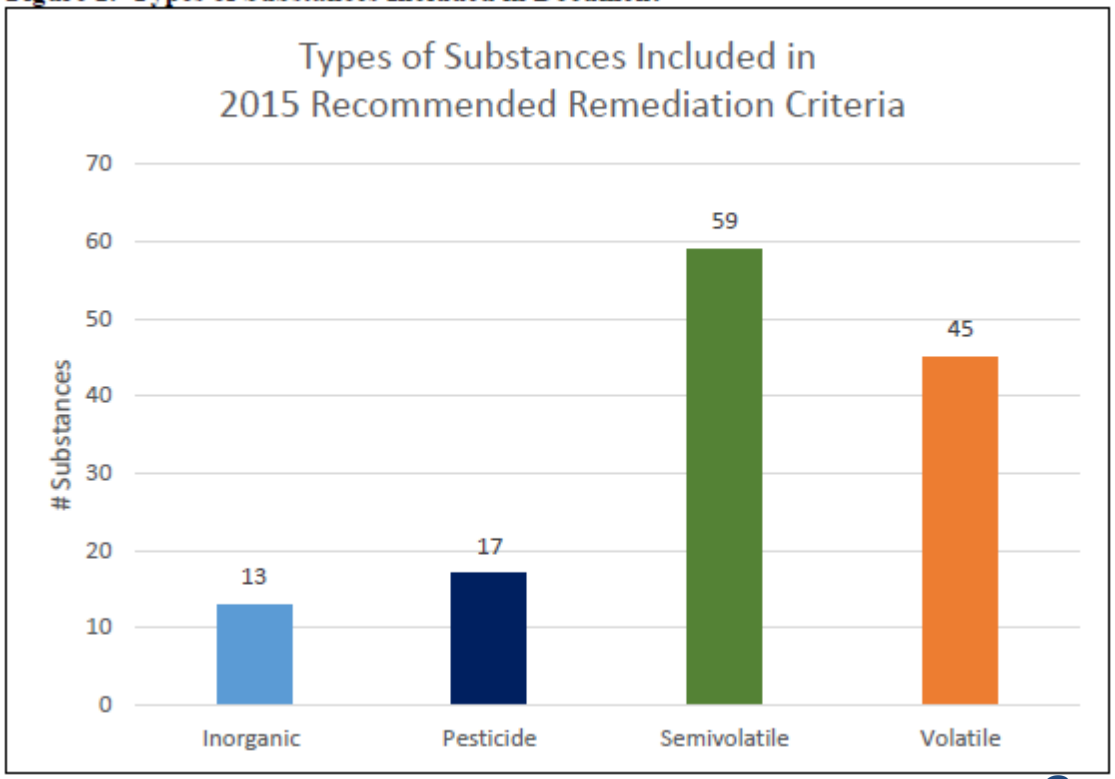
Technical Support Document:

Recommended Numeric Criteria for Common Additional Polluting Substances and Certain Alternative Criteria

December 10, 2015
(Rev. 3/8/16)

N= 134 APS Determinations

Figure 2. Types of Substances Included in Document`

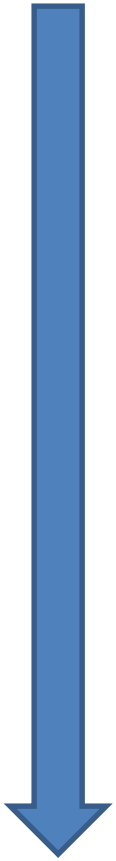


Reasons Chemicals "Emerge"

- New chemicals or uses
  - E.g. – PFAS, MtBE
- New ability to detect
  - E.g. – 1,4-dioxane, perchlorate
- New understanding of fate/transport/sources
  - E.g. – PCBs at schools, EDB in groundwater
    - Chlordane??
- New toxicology/epidemiology
  - E.g. – TCE acute intervention; CrVI
- Testing programs - UCMR

How Chemicals "Emerge"

LOCAL



NATIONAL

- Waste site monitoring
  - 1,4-Dioxane associated with TCA spills
  - PFOS/PFOA – Minnesota, 3M – biomonitoring, fish
    - Parkersburg WV – 2004 biomon 70x > US pop
  - MtBE – obvious that it would be in gw from LUST
    - Not obvious that it would be so ubiquitous
  - Perchlorate – Colorado River spill; western waste sites – 1990s
- USGS monitoring
- UCMR monitoring → Federal or State MCL?
- EPA ***modeling*** of sources and at risk public wells

Unregulated Contaminant Monitoring Rule

- US EPA-initiated survey of PWS for ECs in DW
- Candidate Contam List (CCL) → UCMR → MCL
- UCMR 3, 2013 to 2015
- List 1 (21 chems) tested for at all PWSs serving > 10,000 customers + 800 smaller supplies
  - CrVI,
  - 1,4-dioxane,
  - 6 PFAS chemicals
  - 1,2,3-trichloropropane
  - Chlorate
- List 2: 7 estrogens and testosterone

Many CCL Chemicals Become Monitored Under UCMR

32 of the 116 CCL3 Highlighted in AWWA 2014

- Nitrosamines
- *N-nitrosodimethylamine (NDMA)*
- *N-nitrosodiethylamine (NDEA)*
- *N*-nitrosodi-n-propylamine (NDPA)
- *N-nitrosopyrrolidine (NPYR)*
- *N-nitrosodiphenylamine (NDPhA)*
- Chlorate
- Molybdenum, Strontium, & Vanadium
- 1,1,2-Tetrachloroethane
- 1,2,3-Trichloropropane (TCP)
- 1,3-Dinitrobenzene
- 1,4-Dioxane
- Methyl *tert* butyl ether (MTBE)
- Nitrobenzene
- PFOS/PFOA
- RDX (cyclotrimethylenetrinitramine)
- Dimethoate
- Disulfoton
- Diuron
- Molinate
- Terbufos
- Terbufos sulfone
- Acetochlor
- Actochlor ethanesulfonic acid
- Acetochlor oxanilic acid
- Alachlor ethanesulfonic acid
- Alachlor oxanilic acid
- Metolachlor
- Metolachlor ethanesulfonic acid
- Metolachlor oxanilic ac

Sources

- New detections from historic ind/comm releases
  - Even residential uses (e.g., chlordane)
- Current industrial uses and releases
  - E.g. – PFAS as fume suppressant chrome plating baths
  - Need knowledge of industrial processes, wastestreams and how changed over time
    - Brainerd MN WWTP Case Study
      - High PFOS in WW samples – traced to an upstream chrome plater
  - Recycling – do we create new pathways for chem contamination

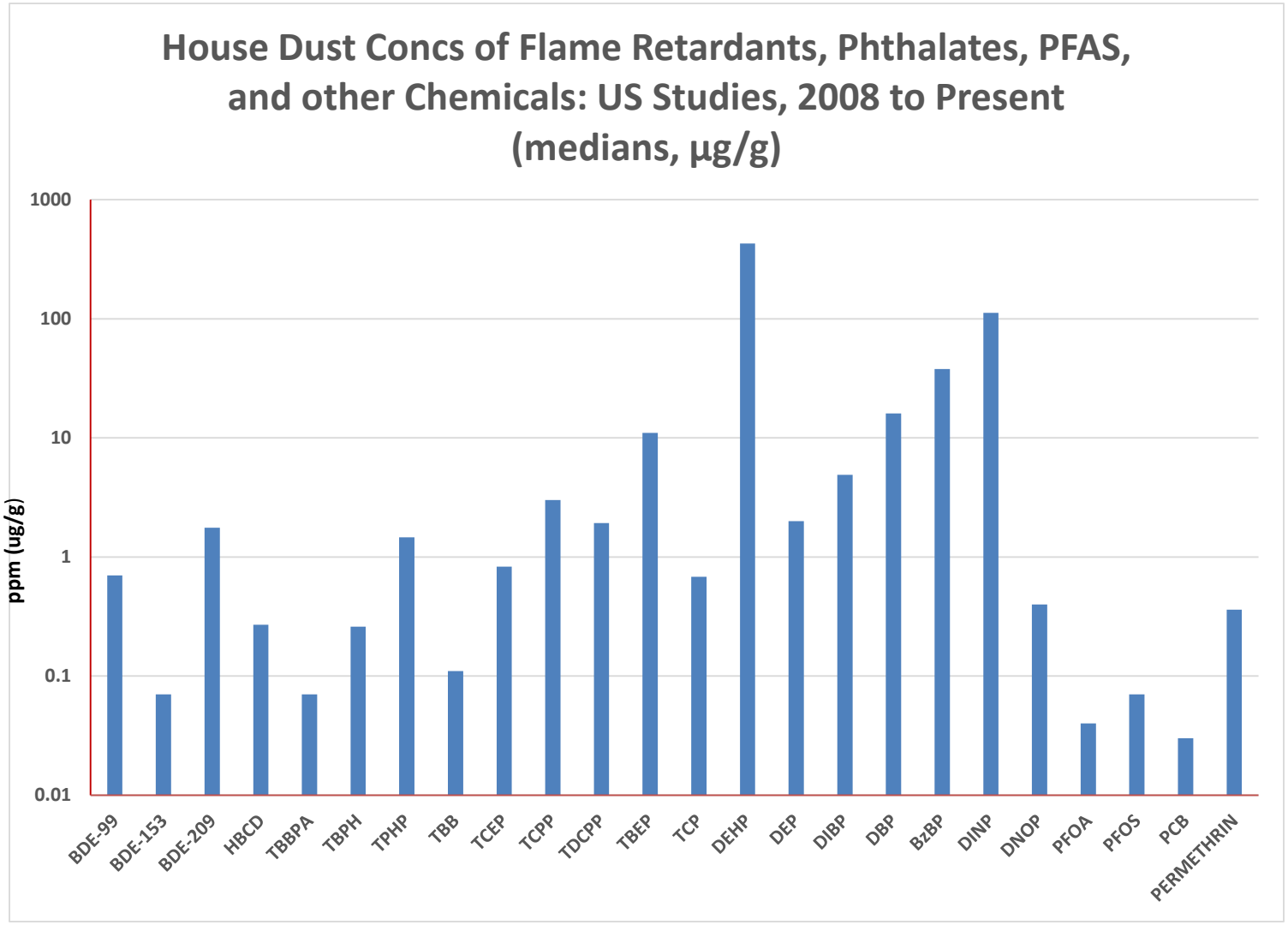
Sources (cont)

- **Landfills:** phthalates, PFAS
- **Agriculture/Extermination**
  - Legacy pesticides with increased testing in gw
    - Chlordane – many detects in Stamford wells
    - Chlordane/dieldrin/arsenic in soil
  - Modern pesticides – atrazine, glyphosate
  - Biosolid soil amendments – fertilizer
- **Sewage treatment plants**
  - PPCPs, PFOS
- "**Process wastewater**" if not handled properly
  - E.g., released to septic system
- **Air releases** from combustion
  - E.g., if plans had proceeded to put Mn in gasoline
  - Outdoor wood boilers

Media of Concern for Emerging Contaminants

- **Ground Water / Drinking water**
  - If no MCL, no one is testing tap water
    - E.g., perchlorate, PFAS
  - EPA's UCMR important role
  - Importance of Phase I and II investigations
    - Limitations in typical lab scans
      - Peak chasing can help identify emerging contams
    - Importance of site history, inventoried chemicals
- **Surface Water**
  - Persistent chemicals → potential for fish accumulation
- **Soil:** most air deposition and disposal sources known
  - Biosolid fertilizer for agriculture and home gardens
- **Food:** diet typically the major source for persistent chems

Chemicals “Emerge” into the Home from Products and Built Environment



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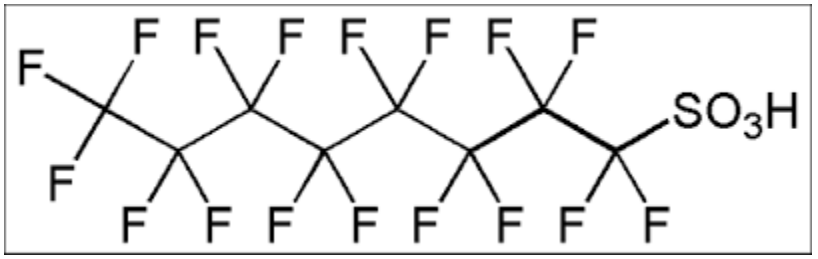
Media of Concern for Emerging Contaminants

- House Dust
  - Exposure source for young children and pets
  - Indicative of novel chemicals in consumer market and built environment
  - Likely to also be in various environmental media
    - Industrial discharges
    - Sewage discharges
    - Landfills

PFAS:



- Many industrial, commercial, consumer uses
- 8 carbons – PFOS/PFOA phased down
- 6 carbons – use increasing (e.g., PFHxS)
- Toxicology concerns
  - Metabolic disorders – liver enlarges
  - Thyroid dysfunction
  - Fetal and early life development
  - Cancer
  - Half-life of years in humans
  - Persistence and accumulation in fish/environment

PFAS Detections

- Pease NH AFB, 1956-1991
  - 1970 aqueous film-forming foam (AFFF)
    - plane crashes and firefighting training
  - Affected Portsmouth NH drinking water wells
    - Concs > 200 ppt PFOS
- Hoosick Falls NY public well > 600 ppt PFOA
  - Saint-Gobain Performance Plastics well: up to 18000 ppt
  - Resident died of kidney cancer, son tested tap water
- Other plastics manufacturing and chemical plants prompt testing and detects
  - Petersburgh NY
  - Merrimack NH

PFAS: Interim/Emerging DW Targets

- USEPA Health Advisory, May 2016: 70 ppt
  - PFOS + PFOA
- VT target: 20 ppt
- NH target: 40 ppt
- NY target: 100 ppt (at Hoosick Falls)
- NJ target: 40 ppt
- No standards yet for other PFAS
  - is C6 the next to “emerge”??

Biomonitoring of PFAS in Portsmouth Area, NH

Table: Summary of 108 Child Results (aged 11 years and younger) From the First Round of Testing.

	PEASE TRADEPORT (Level in µg/L)				TEXAS STUDY* (Level in µg/L)		
PFC Tested	Geometric Mean	Median	Min	Max	Median	Min	Max
PFOA	4.0	4.5	<0.1	12.0	2.9	<0.1	13.5
PFOS	8.9	8.9	0.5	30.8	4.1	<0.2	93.3
PFHxS	6.1	7.4	0.2	26.2	1.2	<0.1	31.2
PFUA	<0.1	<0.1	<0.1	0.5	N/A	N/A	N/A
PFOSA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6
PFNA	1.1	1.0	<0.1	5.2	1.2	<0.1	55.8
PFDeA	0.2	0.2	<0.1	0.7	<0.2	<0.2	2.1
Me-PFOSA-AcOH	0.1	<0.1	<0.1	1.3	<0.2	<0.2	28.9
Et-PFOSA-AcOH	<0.1	<0.1	<0.1	0.2	<0.2	<0.2	0.7

*Comparison numbers are from: Schecter et al. Polyfluoroalkyl Compounds in Texas Children from Birth through 12 Years of Age. Enviro Health Perspect 2012;120(4):590-594.

Contaminated drinking water may have increased median but not max exposure
What does it mean?

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Where Does Your Water Come From?

?

PPCPs

?

The Arguments For/Against PPCPs Public Health Concern

YES, A Concern

- WWTPs can't remove
- Chem interactions?
- Fish affected
- Supplies not sampling
- No one knows what it means!!

NO, Not a Concern

- Only trace levels – chemist's fault
- Pharmas taken >> levels
- Many systems not affected
- Not really a new issue
- No documented effects

What PPCPs are being found

- Ibuprofen – British rivers – 3 ppm
- Tylenol
- Various EDCs, mostly estrogenic (BPA)
- Caffeine
- Carbamazepine
- DEET
- Erythromycin

Connecticut – No Recycling of Water for Potable Use

- According to State Statute (22a-417)
  1. No industrial or public wastewater discharges into public drinking water supply drainage areas;
  2. No degradation of land owned within public water supply watershed areas.
  3. Oversight of ≈100,000 acres of watershed land owned by public water systems
  4. New groundwater wells for public water must be separated away from potential sources of pollution
- Could still have private wells affected by septic

Myth:

Rx Drugs Should Be Flushed Down Toilet

Reality: Needs proper disposal –

- Efforts being focused on health care facilities
- Consumers – some pharmacies offer “take back” days

Releases from Pharmaceutical Manufacturing,

Larsson et al. 2014

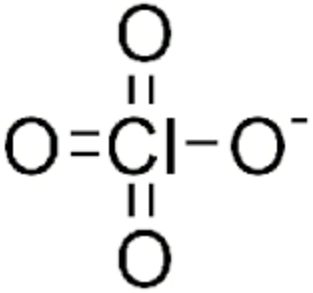
Chemical Analysis

		surface water: ciprofloxacin 6.5 mg l		
Switzerland	oseltamivir—antiviral	surface water: 160 ng l^{-1}	2010	[18]
USA	narcotic opioids	effluent: metaxalone 3.8 mg l^{-1}	2010	[19]
India	fluoroquinolone antibiotics	river sediment: ciprofloxacin 914 mg kg^{-1} organic material	2011	[20]
Korea	lincomycin—antibiotic	effluent: 43.9 mg l^{-1}	2011	[21]
Israel	venlafaxine and metabolites	effluent: venlafaxine 11.2 μg l^{-1}	2012	[22]
Israel	carbamazepine and venlafaxine	effluent: venlafaxine 11.7 mg l^{-1}[b]	2013	[23]
Pakistan	several antibiotics	surface water: sulfamethoxazole 49 μg l^{-1}	2013	[24]
India	fluoroquinolone antibiotics	groundwater: ciprofloxacin 770 ng l^{-1} soil: ciprofloxacin 7.2 μg g^{-1} organic matter	2014	[25]
Spain	venlafaxine	effluent: 2.6 μg l^{-1}	2014	[26]

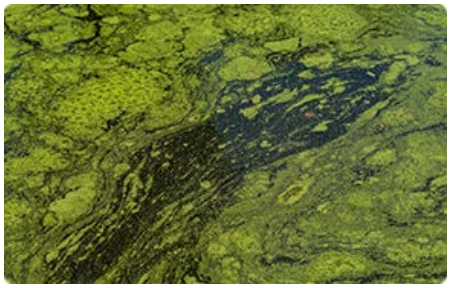
Bioassays

France	fish	plasma vitellogenin and intersex	field	no	2010	[46]
China	bacteria	antibiotic resistance and taxonomy	field	yes	2011	[47]
India	microbial communities	antibiotic resistance gene abundance and taxonomy	field	yes	2011	[20]
India	fish	protein expression and enzyme activities	laboratory	yes	2013	[48]
India	bacteria	antibiotic resistance and bacterial genetics	field	(yes)	2013	[49]
India	rats	gene expression, blood chemistry and weight gain	laboratory	yes	2013	[35]
India	bacteria	antibiotic resistance and bacterial genetics	field	(yes)	2013	[50]
Pakistan	bacteria	antibiotic resistance gene abundance	field	yes	2013	[24]
India	bacteria	antibiotic resistance gene abundance	field	yes	2014	[25]

Perchlorate



- Rocket fuel, munitions, blasting
  - Military bases
  - Production facilities out west
- Potentially used in road and housing construction
- Fireworks displays - surface and groundwaters
- UCMR-2: sufficient PWS detects for federal MCL
  - EPA still sorting through effects on thyroid and brain development in low iodide early life scenario
  - State MCLs: MA 2 ppb; CA 6 ppb
- No detections found in CT UCMR-2 results



Cyanobacteria

- "Blue-green algae" blooms associated with
  - Microcystin and other harmful toxins
  - Liver toxicity, cancer
  - USEPA 2015 Health Advisory: 0.3 ug/L
- Toledo OH drinking water – Lake Erie
  - Summer 2014, Spikes in microcystin-LR
  - Water shut off to 500,000 residents
  - Treatment and daily monitoring since then
- Several CT waterbodies and supplies affected
  - Visible evidence, testing, alt water on temp basis
- Potential exposure from fish and swimming
- Source of problem: nutrient loading, warmer summers

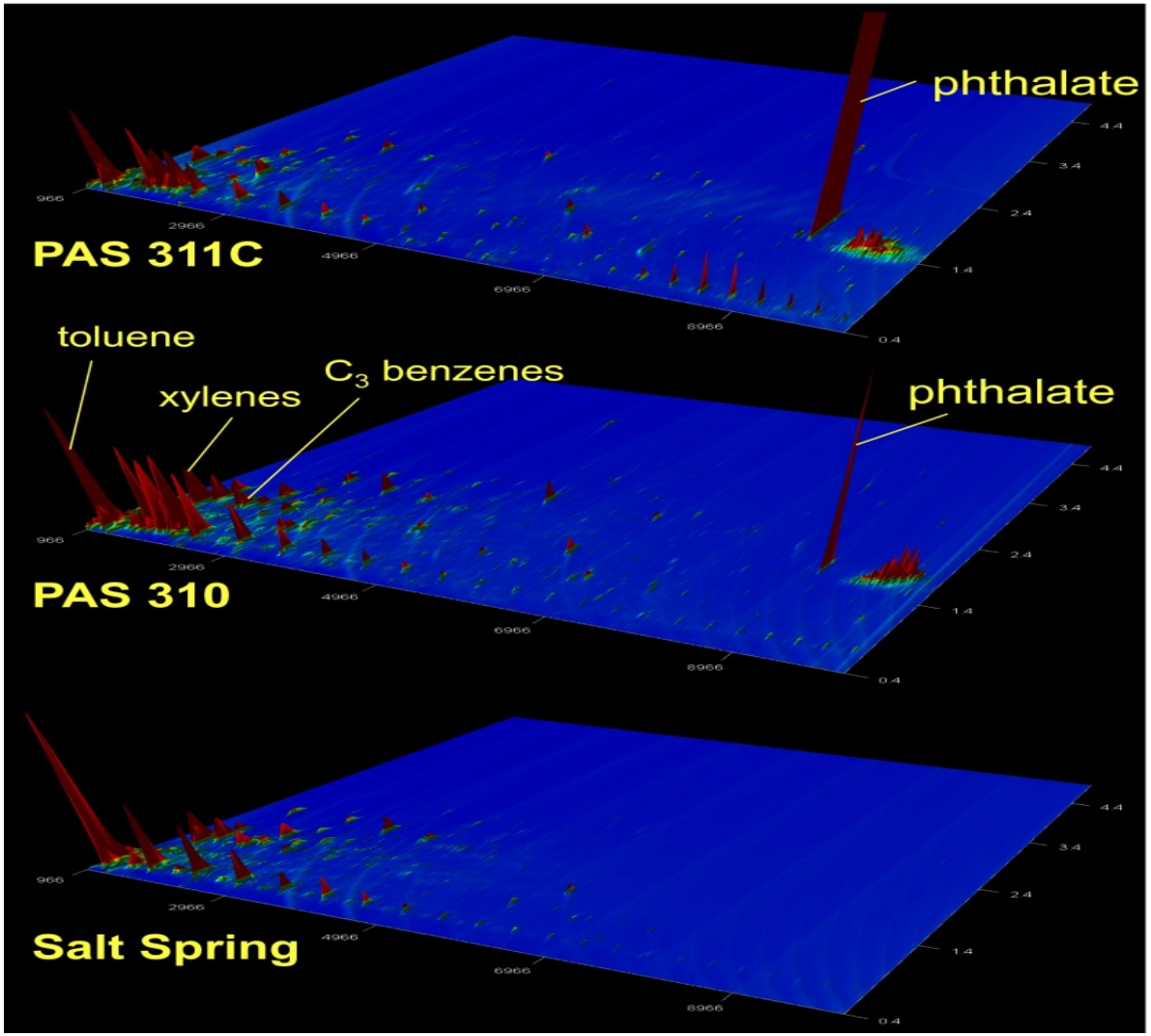
Chlorate in Water Supplies

- Disinfection processes, bkdwn of hypochlorite
- Bleaching in pulp, paper mills
- Agriculture
- Detects common in the UCMR-3
  - Guidance level of 210 ug/L
  - Cousin of perchlorate, also affects thyroid

Phthalates

- Plasticizers common in PVC, cosmetics, flooring, consumer products, medical tubing
- Anti-male endocrine disruptive effects
  - Period of in utero development most sensitive
  - Tox values still being developed
- DEHP, high concern phthalate
  - Phased out of toys, medical tubing
- Levels in environment can be substantial
- Not commonly sampled – lab blank issue

DEHP – fingerprint of GW contamination from hydraulic fluid from Marcellus Shale fracking operations, PA



Drollette et al. PNAS 2015

Barnes et al. 2004: Leachate Plume from Norman OK Landfill, USGS

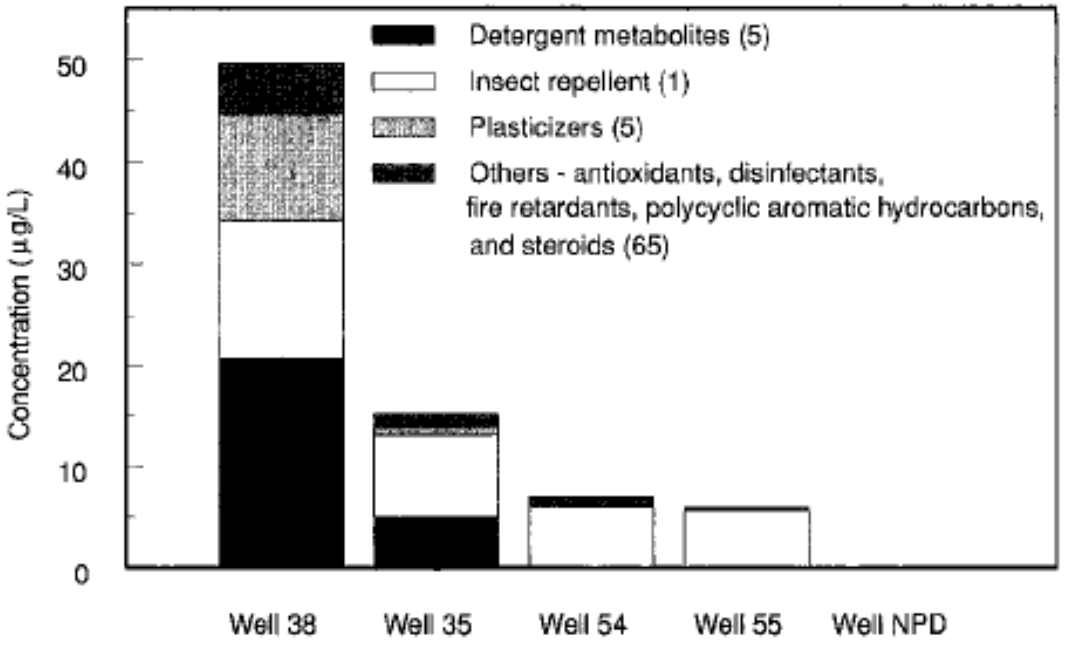


Figure 3. Total measured concentrations of organic waste water contaminant general use groups, by site. Number of compounds in each group shown in legend.

Table 3

Analytical Results of Ground Water Sites Sampled for 76 Organic Waste Water Contaminants (concentrations in µg/L)

OK Landfill, Barnes et al.

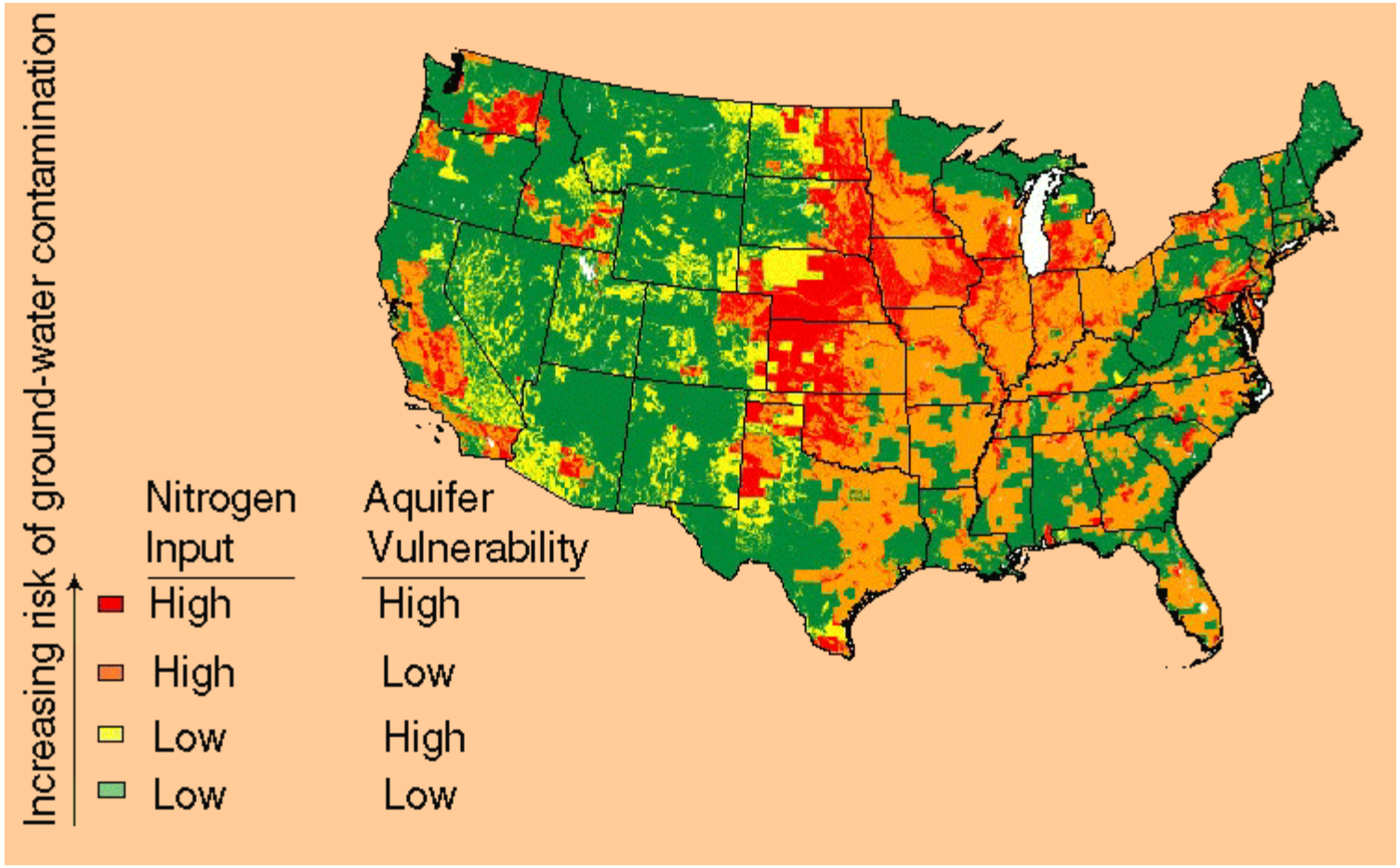
Compound Name	Well 35	Well 38	Well 54	Well 55	Well NPD
cholesterol	0.042	0.044	0.022	0.039	0.022
coprostanol	0.074	0.057	< 0.005	< 0.005	< 0.005
cotinine	0.13	< 0.05	0.12	0.10	< 0.05
2,6-di-*tert*-butylphenol	< 0.15	0.23	< 0.08	< 0.08	< 0.15
2,6-di-*tert*-butyl-1,4-benzoquinone	0.4[a]	0.9	< 0.5	< 0.5	< 0.6
anthracene	< 0.06	< 0.06	0.02[d]	< 0.05	< 0.05
3-*tert*-butyl-4-hydroxy anisole	0.2[a]	< 0.12	< 0.12	< 0.12	< 0.12
bis(2-ethylhexyl) phthalate	< 2.5	250[b]	< 2.5	< 2.5	< 2.5
bisphenol A	0.84	0.50	< 0.09	< 0.09	< 0.09
fluoranthene	< 0.03	< 0.03	0.01[d]	< 0.03	< 0.03
lincomycin	0.10	< 0.05	< 0.05	< 0.05	< 0.05
4-methyl phenol	0.19	0.49	< 0.04	< 0.04	< 0.06
naphthalene	0.063	0.09	< 0.02	< 0.02	< 0.025
N,N-diethyltoluamide	8.1	13	6.1	5.5	< 0.08
4-nonylphenol	1[c]	3[c]	< 0.5	< 0.5	< 0.70
4-nonylphenol monoethoxylate	3[c]	7[c]	< 1.00	< 1.00	< 1.00
4-nonylphenol diethoxylate	< 1.10	10[c]	< 1.10	< 1.10	< 1.10
4-octylphenol monoethoxylate	0.4[c]	1[c]	< 0.10	< 0.10	< 0.12
4-octylphenol diethoxylate	0.2[c]	0.3[c]	< 0.20	< 0.20	< 0.20
stigmastanol	< 2.0	2[a]	< 2.0	< 2.0	< 2.0
triclosan	< 0.05	0.21	< 0.04	< 0.04	< 0.05
tri(2-chloroethyl) phosphate	0.36	0.74	0.25	0.22	< 0.04

[a]Concentration estimated—average recovery < 60%
[b]Concentration estimated and changed to 10 µg/L (five times the reporting level) for summary statistics; value greater than highest point on calibration curve
[c]Concentration estimated—reference standard prepared from a technical mixture
[d]Concentration estimated—value less than reporting level
Compounds suspected of being hormonally active are in bold (National Research Council 1999; Foran et al. 2000).

USEPA Nitrate GW Estimates

State	Estimated area (mi^2) of state with groundwater nitrate concentrations > 5 mg/L	Estimated % of state area with groundwater nitrate concentrations > 5 mg/L	Estimated % of population with self-supplied drinking water
Alabama	646	1%	11%
Alaska	No data	No data	35%
Arizona	12,763	12%	4%
Arkansas	1,606	3%	7%
California	15,004	10%	7%
Colorado	4,628	4%	6%
Connecticut	276	6%	24%

USGS Nitrate Prediction Map of US



Research Links Nitrate In Drinking Water To Birth Defects (May 2016)

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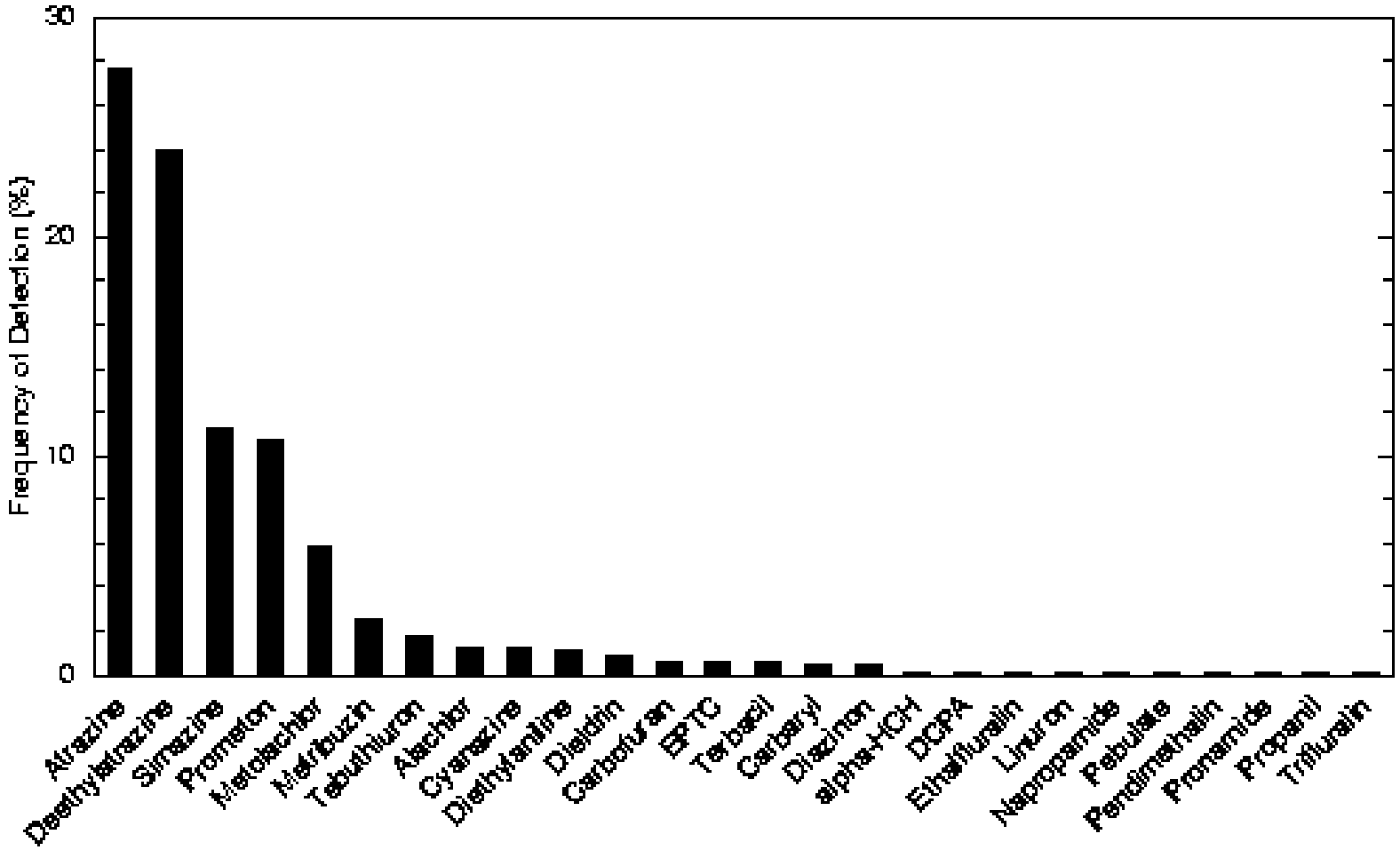
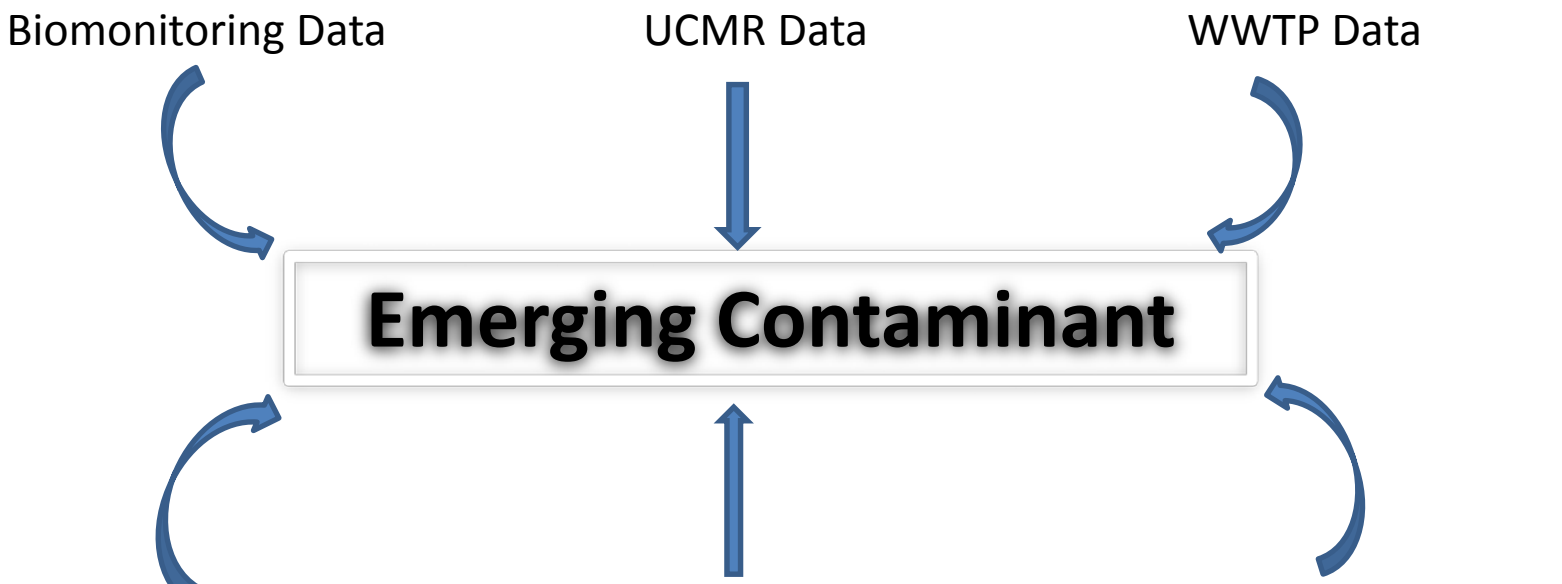
Pesticides in GW Across US (USGS, 1998)



Staying Ahead of the Curve



Questions / Comments

Please speak loudly.

www.ct.gov/deep/remediationroundtable

Proposed Amendments to Environmental Use Restriction Regulations

Peter Hill
Remediation Division
Supervising Environmental Analyst

22a-133o CGS

- New term created “Environmental Use Restrictions”
  - includes ELURs and Notice of Activity and Use Limitations (Deed Notices)
- Includes broad authority for the Commissioner to adopt regulations for EURs

Deed Notice Refresher

- Deed Notices
  - Notice, not an interest or easement in the land held by the State
  - Filed on public land records
  - Enforceable by statute
- Deed Notices can be used if there is
  - no conflict with existing interests and
  - no interests allow for excavation of polluted soil
- Notice Provisions for Holders of Interests

Proposed Regulatory Amendments to 22a-133q-1 RCSA

Goals:

- Consistency with Transformation Goals – protective, efficient, and flexible

- Ensure long-term protectiveness of EURs

Proposed Regulations

- Clarify and streamline ELUR and Survey regulations
- Include new regulations:
  - Notice of Activity and Use Limitations (Deed Notices)
  - Notice of Registration for public roads
- Support new circumstances for use of Deed Notices included in **RSR Wave 2 Conceptual Language**

Proposed Survey Regulations

- Revised A-2 survey requirements
  - Specify EUR survey standards and requirements
  - Are consistent with current regulations, standards, and guidelines for surveys in the State of Connecticut
  - Provide flexibility when the EUR applies to only a portion of the property –potentially saving significant time and money

Proposed Deed Notice Regulations

- LEP or Commissioner approval of Deed Notices, Amendments and Releases
- LEANED preparation, implementation and post-approval reporting process
- Standardized Forms and Reporting to support self-implementation by owner with LEP oversight

Proposed Allowable Disturbance Regulations

- Provision to allow disturbances of inaccessible soil and engineered controls for DEC built into EUR
- No TSCA PCBs
- Self-implementing with LEP oversight
- For small, short-term activities (90 days, ≤ 250 yd^3 and ≤ 500 ft^2)
- Provisions for DEEP notification, LEP oversight, soil management, work area restoration and reporting

Proposed Road Registration Regulations

- Applies to public roads and related sidewalks and landscaping
- For soil rendered inaccessible only, no PCBs
- Registration submitted by owner using a DEEP form following public notice
- Summary of pollutants and map showing location of registration
- Registration with DEEP

Long-Term Protectiveness of EURs

- Periodic inspection by owner and LEP
- Right to Know
- Notice to workers who may be exposed to pollution addressed by EUR
- Record keeping requirements

EUR Fees

- No fees for Deed Notices, Amendment and Releases

- ELURs and Releases approved by Commissioner new fee:
  - ELUR = $2,500
  - Releases = $625

Next Steps

- Complete draft of regulations
- Finalize draft for formal public comment
- Goal is to roll out regulations with Wave 2 RSRs

Questions / Comments

Please speak loudly.

www.ct.gov/deep/remediationroundtable

Remediation Roundtable

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Connecticut Department of Energy and Environmental Protection

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