1,-4-Dioxane
New Hampshire’s Experience

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Overview

- History/role of programs
- Case studies
  - Illustrate characteristics/challenges
1,4-Dioxane – Emerging(ed) Contaminant

- 2001 - White paper
- 2003 – First detection
- 2004 – Guideline of 3 ppb
- 2008 – Sampling at solid waste/hazardous waste sites
- 2009 – Sampling at groundwater discharge sites
- 2010 – Revised IRIS (10^-6 cancer risk = 0.35 ppb)
- 2011
  - Reporting limit of 0.25 ppb
  - Data coming in (2 WWTF and 68 sites)
  - 3 Lab methods
- 2015
  - Env-Or 600 readopted (AGQS=3 ppb)

Role of Various Programs

- Contaminated site program
  - Hazardous waste sites
  - Unlined and lined landfills
- Contaminated well program
- Drinking water program
- Groundwater discharge program
- Environmental health program (risk assessment)
- Laboratory services
Contaminated Site Program

- 1,4-dioxane detected many sites
  - “State Sites”
  - Superfund Sites
  - Landfills
    - Most unlined
    - Lined landfills (leachate)
- Most sites CVOCs present
- Large majority of sites monitoring under permit
  - A few impacted water supply wells identified (one large site)

Contaminated Site Management

- Results to date (since 2008)
  - 1,4-dioxane routine COC
    - Hazardous waste – (31%)
    - Unlined landfills - (82%)
  - Range of impacts/actions
    - Additional remediation/continued operation
    - Expanded plumes (GMZ)
      - Alternate water
    - Extended closure
    - Added to sampling program (GMP)
Contaminated Well Program

- Sites where no viable PRP or source is unknown
- Sampled wells where CVOCs present
- Typical treatment GAC or GAC/air stripping – not effective or reliable for 1,4-dioxane
  - Bottled water provided
- One site w/ extensive 1,4-dioxane (case study)
  - 1,4-dioxane is the driver
- Other sites 1,4-dioxane detected but limited extent
- Research on treatment

Drinking Water Program

- Initiated voluntary sampling program
  - 215 sources
    - 4 sources exceeded 3 ppb
    - 3 sources between 0.35 ppb and 3 ppb
    - 3 sources above reporting limit and 0.35 ppb
  - Evaluated reverse osmosis POU system
    - 75% removal efficiency (influent 9 ppb)
  - Sampled wells w/ history of CVOCs
  - Work closely w/ contaminated site program
- Worked w/ USEPA to identify chlorinated waste sites closed prior to the assessment of 1,4-dioxane
  - Need resources to sample private wells near closed sites
- Require new proposed sources of drinking water for community water systems to sample for 1,4-dioxane
**Town of North Walpole**

- Population – 600
- Drinking water has 2.5-3.5 ppb 1,4-dioxane
- Source of contamination is difficult
  - Deep transmissive aquifer
  - Releases could have occurred over 30 years ago
- Options to assist North Walpole are Limited
  - EPA Waste Programs
  - Drinking Water SRF/Enforcement
  - State Ambient Groundwater Quality Standards
  - USDA/CDBG Loans and Grants

**Unregulated Contaminant Monitoring Rule**

- 54 Sources or Points
- 3 detections
  - 2 GW wells previously identified
  - 1 Distribution point (likely a false positive)
Groundwater Discharge Program

- Permits required for:
  - Domestic wastewater discharges >20k gallons/day
  - Domestic wastewater discharges with reduced setbacks
    Nondomestic wastewater discharges

- Groundwater discharge permits include a provision to sample for 1,4-dioxane as they are renewed

- 1,4-Dioxane has been sampled at approx. 50% of sites

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Unlined Wastewater Lagoons

3 out of 17 sites (0.39 ppb to 3.8 ppb)

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Rapid Infiltration 3 out of 7 sites
(0.53 ppb to 0.83 ppb)

Large Septic Systems
6 out of 18 sites (0.26 ppb to 3.3 ppb)
Primarily Associated with Industrial or Long-Term Health Care Facilities
Groundwater Discharges

Additional Info

- Car wash on Septic
  - 1.0-4.1 ppb groundwater
  - Up to 7.0 ppb effluent
  - 50 ppb in soap/water mixture
  - 10s ppm in soap (higher in base surfactant oil)
  - ***Need to sample drinking water wells near car washes***

- Large Municipal WWTF (NPDES Discharges)
  - 2 samples, 1-3.3 ppb (consistent w/ literature)

Laboratory Services

- Participated in small study of analytical methods
- Maintains list of labs accredited for low level 1,4-dioxane analysis
  - EPA 522
  - SW-846 8260 SIM
  - SW-846 8270 SIM
- 14 labs currently accredited (as of 9/15/15)
Case Study

- Discovered by contaminated well program
  - 4 residential bedrock wells w/ MTBE and CVOCs (2002)
    - Concentrations decreased – ready to remove treatment systems (carbon)
  - Sampled for 1,4-dioxane in November 2011
  - 1,4 dioxane detected over AGQS
  - Expanded sampling

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Atkinson 1,4-Dioxane Study

2/3 12,000 foot of water main
22 wells exceeded 3 ppb and connected
47 properties gained access
Plume length 4000 feet
Case Study (cont)

- March 2012 detected extensive 1,4-dioxane plume
- Focus on waterline extension
  - Treatment unreliable for 1,4-dioxane
- Over 100 wells/400 samples
- No known source
  - 3 areas of industrial development
  - Quick inspection of 50 facilities

Case Study

- Summary
  - +/- 12,000 foot of water main
  - 22 wells exceeded 3 ppb and connected
  - 47 properties gained access
  - Plume length 4000 feet
Summary

- Analyzing for 1,4-D routine (emerged as COC)
- Experience
  - Larger plumes
  - Some impacted water supplies
  - Some remedies revised/some closures delayed
- Integrate programs to solve some of the challenges
- Various standards
- Monitor development of treatment technology
Contact information

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