1,4-Dioxane – NH Experience

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NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Overview

- History/chronology
- Role of different programs
- Case study
- Closing thoughts

History of 1,4-Dioxane - NH

- 2001-2003 circulation of white paper
- 2003 - first detected at Keefe Environmental Services Superfund Site – 606 ppb (max)
- 2004 – guideline of 3 ppb developed
- 2005 – 3 ppb adopted as ambient groundwater quality standard
- January/February 2008 – required sampling at hazardous waste and landfill sites (3 ppb RL)

History (cont)

- 2009 – sampling required at groundwater discharge sites
- 2010 – IRIS toxicity values revised (10^{-6} cancer risk for drinking water = 0.35 ppb)
- 2011 – Required reporting limit of 0.25 ppb
  - Revised IRIS
  - Treatment difficulty
  - Detected at 2 WWTF and 68 contaminated sites
  - 3 lab methods

History (cont)

- 2011 – Voluntary initiative to sample public water systems
- 2011 – Developed fact sheet about health risks
- 2011 – Provided information to public water systems

Role of Various Programs

- Contaminated site program
  - Most of the hazardous waste sites
  - Unlined and lined landfills
- Contaminated well program
- Drinking water program
- Groundwater discharge program
- Environmental health program (risk assessment)

Contaminated Site Program

- 1,4-dioxane detected at over 70 sites (2011)
  - 37 “State Sites”
  - 10 Superfund Sites
  - 29 Landfills
    - Most unlined
    - Lined landfills (leachate)
- Most sites have CVOCs present
- Large majority of sites monitoring under permit
  - A few impacted water supply wells identified

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
  - Sampled wells w/ history of CVOCs
  - Work closely w/ contaminated site program

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

Groundwater Discharge Program

- Large septic systems
  - 1,4 dioxane generally not detected
- Car wash
  - 2 ppb down gradient
  - 10,000 ppb in soap
  - 50 ppb in soap/water mixture
- Unlined pre-treatment lagoon for WWTF
  - 3 ppb
- WWTF
  - 2 samples, 1-2 ppb (consistent w/ literature)

Laboratory Program

- 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

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 (17 max)
  - Expanded sampling

Case Study (cont)

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

Case Study

- Summary of well results
  - 16 well exceed 3 ppb
  - 21 wells exceed 0.35 ppb and less than 3 ppb
  - 19 wells less than 0.35 ppb
- Source of 1,4-dioxane
  - Higher concentrations of 1,4-dioxane generally correlate w/ higher concentrations of VOCs
  - VOCs detected include: (1,1 DCA, 1,1 DCE and *MTBE*)

Closing Thoughts

- Better understanding/more experience
- Need to continue to closely evaluate data and work w/ other programs – what is scope
  - Existing programs
  - Including CCL3 and UCMR3
  - New sites/expanded plumes
- Various standards and feasibility
- Development of treatment technology