

4TH ANNUAL CAPE COASTAL CONFERENCE



A Landfills Impact on Water Supply:
Learning from Eastham's Story to Protect Water

Jane Crowley, Eastham Health Agent



Overview

- History Eastham Landfill
- Environmental Assessment
- Solution to the Problem
- Lessons learned
- Take home message



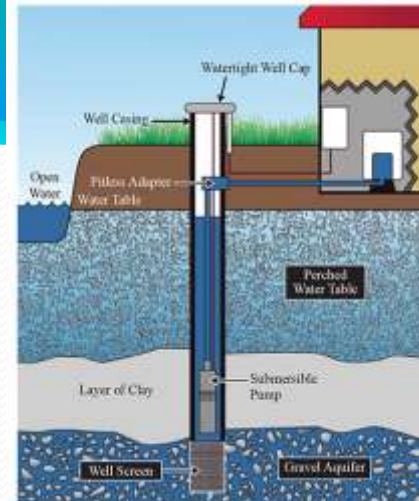
Eastham Landfill

- 10 acres
- Operated 1937 to 1992
- Unlined, capped 1997
- Approved DEP Closure and Monitoring Plan
- Required to test for many contaminants
- Current GW-1 Standard and Drinking Water Guideline 1,4 Dioxane 0.3 ug/l in Massachusetts
- November 2012 exceedence detected at landfill



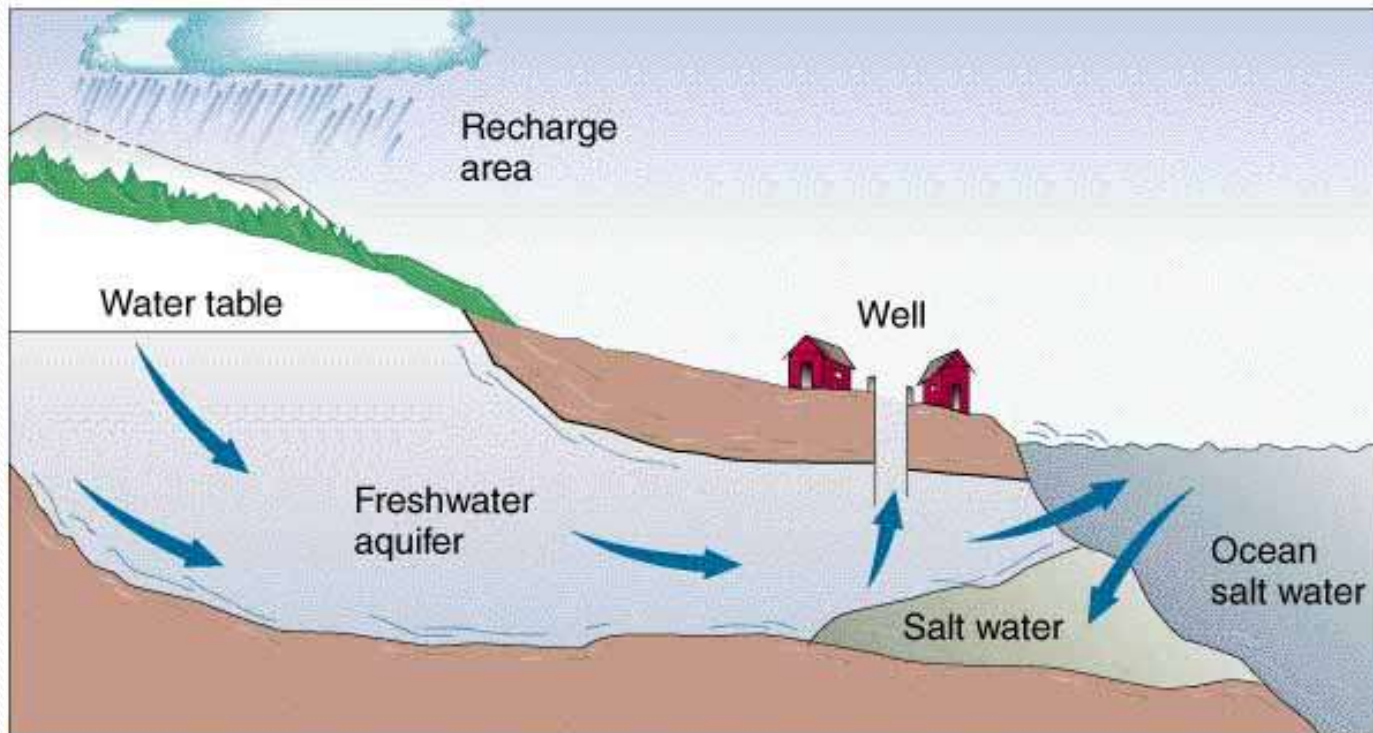
The Problem?

1,4 Dioxane → Private wells



- Historical solvent stabilizer, ethoxylation byproduct
- Miscible in water.....completely soluble
- Highly mobile
- High leaching potential to groundwater...migrates through soil, not adsorb to particles
- Physical/chemical properties resistant to degradation
- Methods to remove it from the environment are generally ineffective and very expensive

Where did it come from?



(a)

Sources of 1, 4 Dioxane*



Industrial

- Solvent
- Degreasers
- Paint Strippers
- Varnish
- Impurity in antifreeze

Personal Care Products

Tide

Clairol Herbal Essence

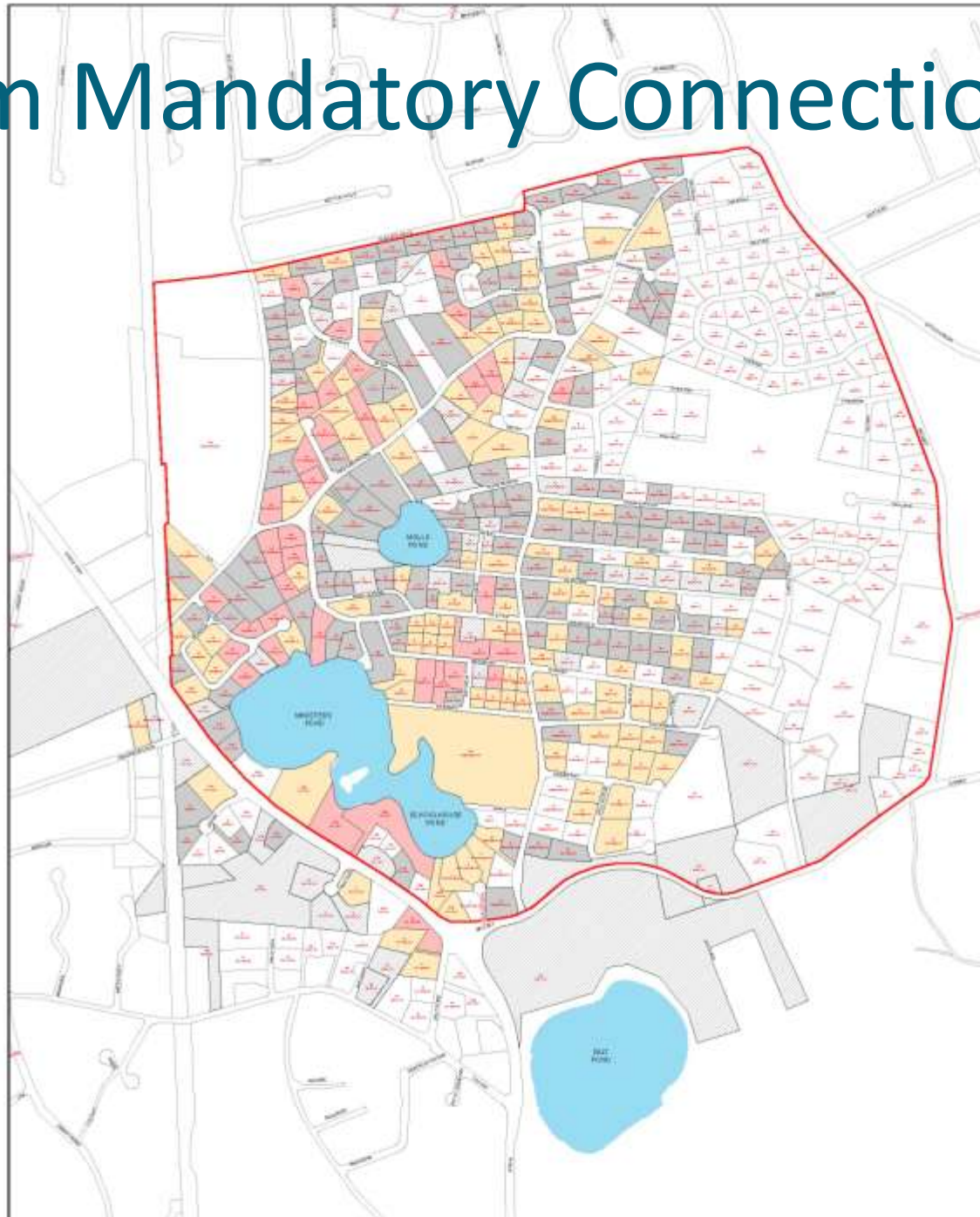
Hello Kitty Bubble Bath

Ms. Myers Dish wash Soap

Johnson Head to toe baby shampoo

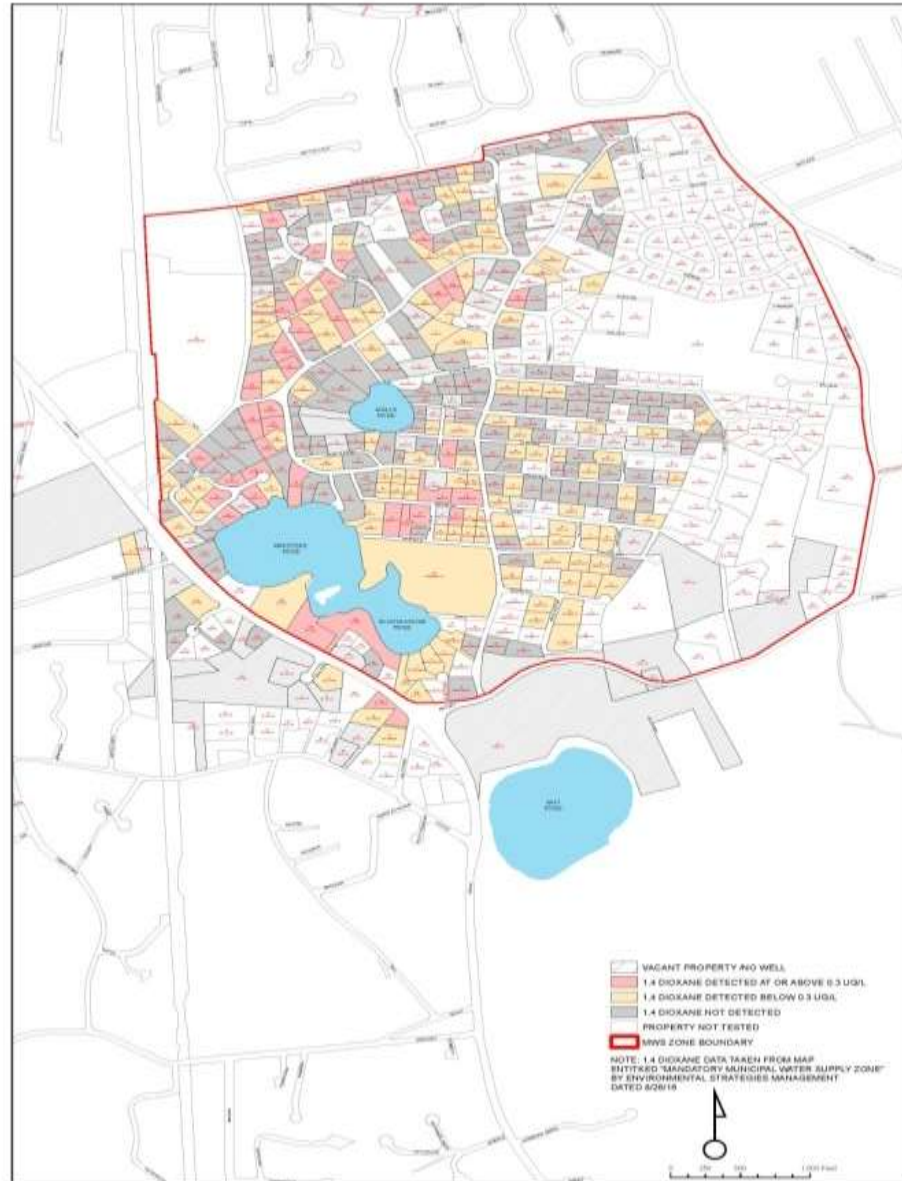
** Break down product of Polyethylene glycol, alcohol ethoxylates, PEG, Polyethylene etc.*

Eastham Mandatory Connections



Eastham Results

Red (above 0.3 ug/L)	39
Yellow (.04- 0.3 ug/L)	112
Gray (none detected)	160
White (not tested)	99
Total	410



1, 4 Dioxane Results by % of Samples tested

Red above 0.3 ug/l = 12.5%

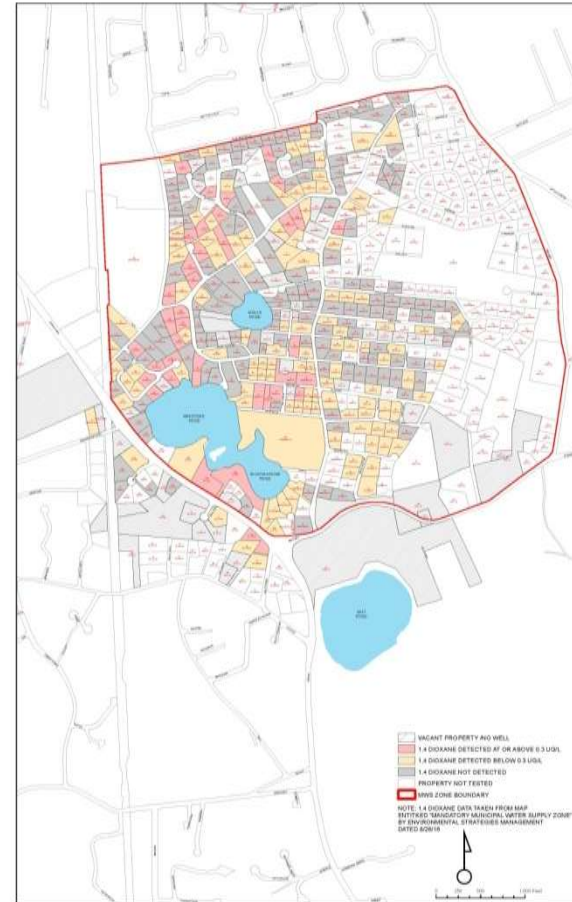
Yellow below 0.3 ug/l above detection limit = 48.5%

Grey non-detect 0.04 ug/l = 51.5%

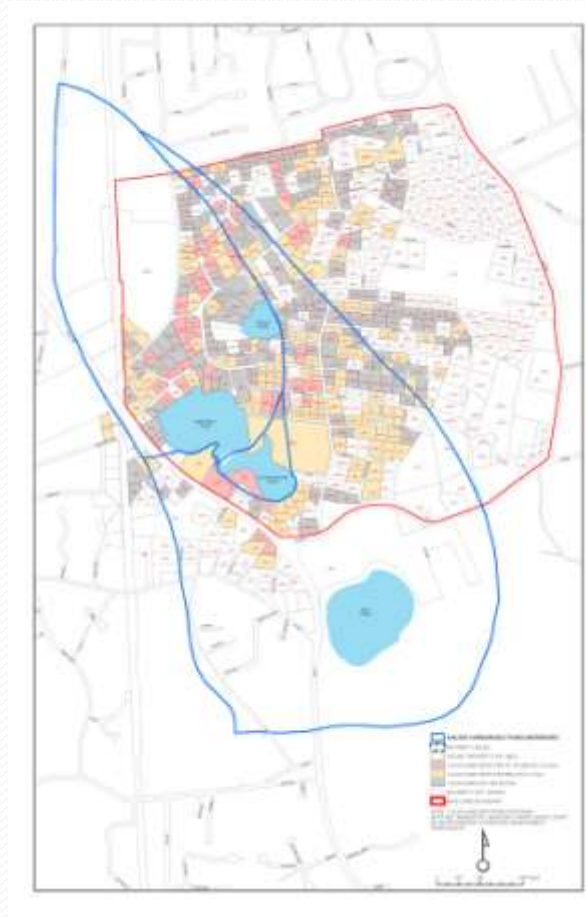
Method EPA 8270 SIM

Total tested = 311

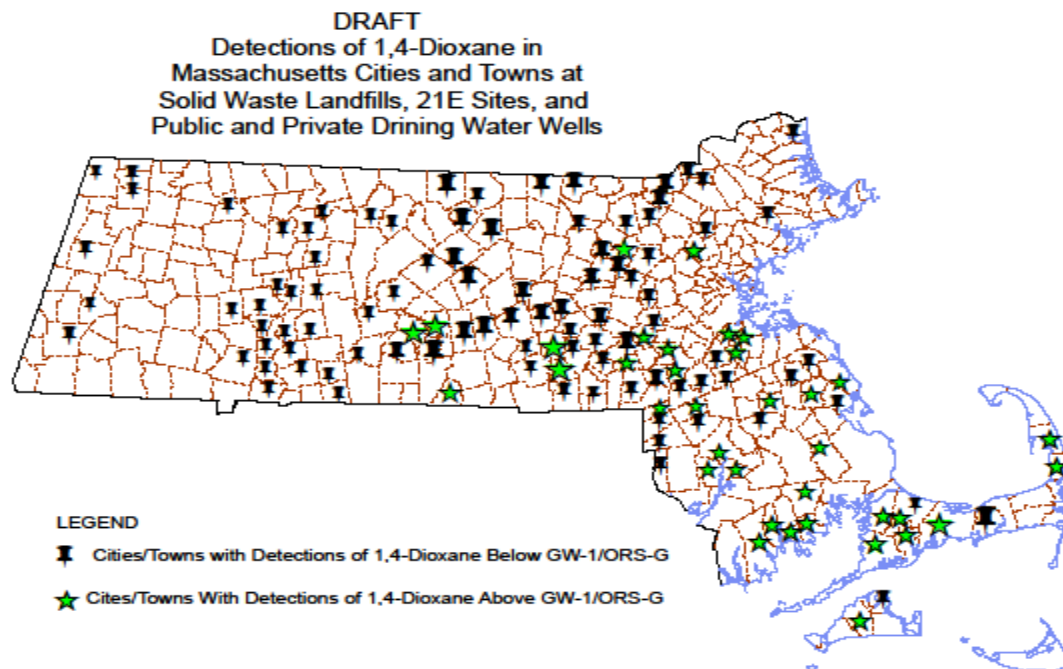
Reporting limit = 0.15 ug/l



Eastham Landfill with Salt Pond Watershed boundary



Massachusetts 1, 4 Dioxane



Source: UCMR3 Data, MassDEP Site File Viewer, MassDEP Solid Waste Files

THIS DATA IS FOR REFERENCE ONLY; THIS DATA IS NOT INTENDED TO BE USED FOR DECISION MAKING.

*"For Intra-Agency Policy
Deliberations Only"*

All data subject to revision



Regulation Standards Vary by State

State	2009	Present
Alabama	--	0.67
Alaska	--	77
California	3	1
Colorado	6.1	0.35
Connecticut	--	3 or 50*
Florida	3.2	3.2
Georgia	70	70
Maine	--	4
Massachusetts	--	0.3
Michigan	85	0.67
Nevada	6.1	--
New Jersey	10	0.4 (draft)
New Hampshire	3	0.35
North Carolina	7	3
Pennsylvania	5.6	6.4
South Carolina	6.1	0.67
Texas	83	9.1
Wisconsin	--	3
-- values not found		
*: bathing and showering		
data are in micrograms per liter (ug/L)		

From: AECOM presentation at NEWMOA
in September 2015.

Eastham Municipal Water Project

Voter History

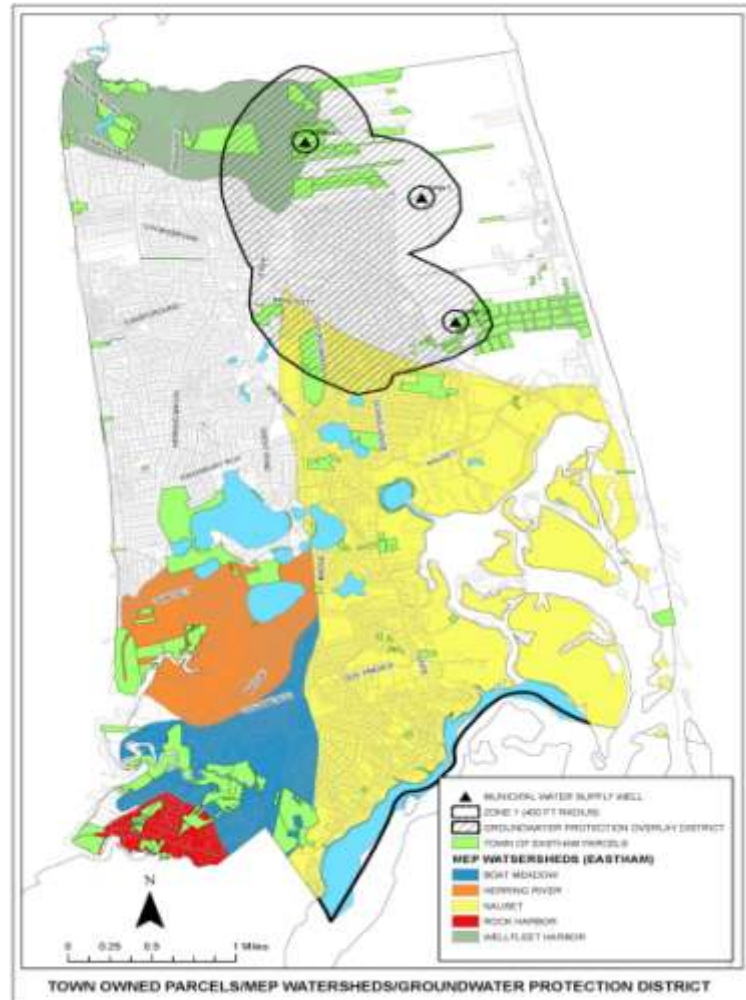
Town Approval Requires both:

Funding Approval requires 2/3 majority support at Town Meeting
Majority approval at Ballot

- | | |
|-------------------|---|
| • May 2007 | System Failed to gain 2/3 support |
| • October 2007 | System Failed to gain 2/3 support |
| • May 2009 | Construction & permit supply wells approved |
| • May 2012 | System Failed to gain 2/3 support |
| • May 2013 | System Failed to gain 2/3 support |
| • May 2013 | Approved at Ballot |
| • June 2013 | System Failed to gain 2/3 support |
| • May 2014 | Approved Phase 1 - Partial System (45.8 Million) |
| • May 2015 | Approved Town Wide System (85 Million) |

Municipal Well Locations

Ground water Protection Map



Construction Phase 1 *underway*

Water delivery begins Fall 2016



Who is paying for it?

- Total Cost = \$130 million
- Funded based on tax rate:

Eastham Tax rate \$7.90 per \$1000.00

0.61 cents/\$1000.00 will go towards water project

- For example:



\$400,000 home = \$3160.00 year total

Year 1 approximately \$244.00 year will go towards water

SRF Loans 2.4% over 30 years (3-4 % forgiveness) over 6 years

USDA Grant 75% /loan 25% for 2.4 Million



Lesson #1



- You will never see something you are not capable of finding
- It is difficult to find something if you are not looking for it
- Risk evaluation requires knowing **what** and **how much** is **where**
- **New things are being learned all the time...lower detection capability**

Lesson #2


- It takes a community to support change and change is never easy
- Partnerships and Collaboration are key:
 - Citizens
 - Consultants
 - DEP risk communication
 - EPA Chemsford
 - BU Superfund Research Project
 - BOS
 - BOH *and so many more*

Thank you!!!!



Lesson #3

- Simplify Information: Make it understandable
- Education: Use every method available
- Risk Communication: Keep it fair and balanced.



Minnesota
Department of Environmental Protection

Center for Health Assessment
Toxicology Office of Energy & Environmental Affairs

Department of Environmental Protection
One West Street, Duluth, MN 55812-1000 (763) 555-3300

DATE: 11/19/03

TO: Mr. [Name]

FROM: [Name]


RE: [Name]

1,4-Dioxane in Drinking Water

What is 1,4-Dioxane?

1,4-Dioxane ($C_4H_8O_2$) is a clear liquid used primarily as a solvent in the manufacture of chemicals. It is also used as a laboratory reagent, in adhesives, and it may also be present in small amounts in cosmetics and consumer products such as detergents and shampoos. 1,4-Dioxane dissolves and moves quickly in groundwater.

(Note: 1,4-dioxane is not the same as "dioxin," which is a very different type of chemical.)



How Might I Be Exposed?

People can be exposed to 1,4-dioxane by drinking contaminated water or using it to make beverages such as tea, coffee or formula. The amount of 1,4-dioxane absorbed through the skin during showering and bathing is not significant, although children may be incidentally exposed by ingesting water during bathing. Showering is not generally an exposure pathway of concern because 1,4-dioxane does not readily evaporate from water.

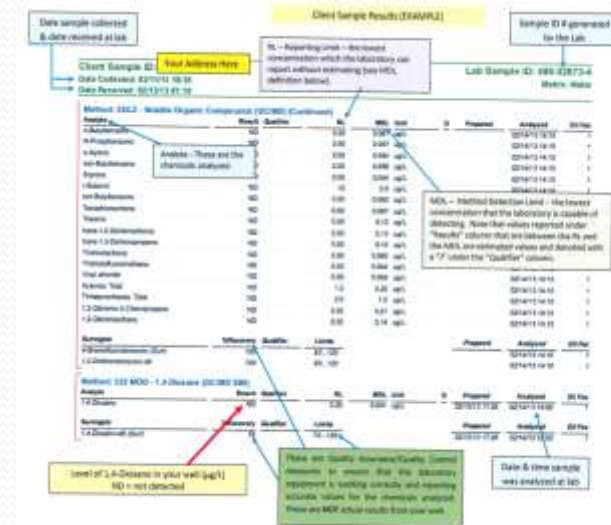
What Are The Health Effects of 1,4-Dioxane?

The positive health effects of 1,4-dioxane depend on the levels in water and the length of time someone is exposed to it. Scientific studies suggest that people exposed to elevated levels of 1,4-dioxane may have an increased risk of certain cancers. In several laboratory studies, high doses of 1,4-dioxane given to animals over long periods of time have caused liver and nasal cancers.

There are also non-cancer health effects associated with exposure to 1,4-dioxane. Very high levels of 1,4-dioxane can affect the nervous system, causing loss of coordination, dizziness and headache. These high levels can also cause liver and kidney damage. The greatest risk to product against cancer effects is low, and thus protects against the non-cancer effects as well.

This document is available on the Internet. Access the Minnesota Department of Environmental Protection website at: <http://www.dnr.state.mn.us>

For more information, contact the Minnesota Department of Environmental Protection at (763) 555-3300 or (763) 555-3300.



Products with Low Levels of 1,4-Dioxane

Laundry Detergents

- Dreft Powder Detergent
- Sunburst
- Clorox Green Works Natural
- Ecos
- Life Tree Laundry Liquid
- Method Squeaky Green
- Seventh Generation Free & Clear

Shampoos

- Aubrey Organics Natural Baby & Kids Shampoo
- Terressential Organic Baby Wash
- Aubrey Organics Swimmers Normalizing Shampoo
- Avalon Organics Nourishing
- Burt's Bees Very Volumizing
- Desert Essence Organics Hair Care Lemon Tea
- Dr. Hauschka Apricot and Sea Buckthorn Shampoo
- Ecco Bella Hair Therapy
- EO Volumizing Shampoo
- Giovanni Golden Wheat Deep Cleanse Shampoo
- Giovanni Smooth as Silk Deep Moisture Shampoo
- Head Organics Clearly Head Shampoo
- Hugo Natural's Geranium Shampoo
- Jason Tea Tree Scalp Normalizing Shampoo
- Kiss My Face Obsessively Organic Whenever Shampoo
- Lamas Soy Hydrating Shampoo for Chemically Treated, Dry or Damaged Hair
- Nature's Gate Organics Fruit Blend Shampoo
- Shikar Natural Everyday Shampoo
- Terressential Organic Sutra Spice Pure Earth Hair Wash

Body Wash (cont.)

- Alba Very Emollient Bath & Shower Gel
- Burt's Bees Body Wash
- Desert Essence Body Wash
- Dr. Bronner's Magic Soaps 18-in-1 Hemp Almond Pure Castile Soap
- Dr. Hauschka Body Wash Fresh
- EO Nourishing Shower Gel
- Giovanni Cleanse Moisturizing Body Wash
- Hugo Natural's Spearmint Shower Gel
- Intelligent Nutrients 100% Nontoxic Plant Chemistry Total Body Cleanser
- Kiss My Face Early to Bed Shower Gel & Foaming Bath
- Nourish Food for Your Healthy Skin Organic Chai Vanilla Body Wash from Sensibility Soaps
- Pure Basic Natural bath & Body Wash Wild Banana Vanilla
- Terressential Organic Body Wash Organic Cool Mint
- Alba Passion Fruit Body Wash

Dishwashing Soap

- Citrus Magic 100% Natural Dish Liquid
 - Clorox Green Works Natural Dishwashing Liquid Free & Clear
 - Earth Friendly Products Ultra Dishmate Natural Almond
 - Life Tree Citrus Fresh Dish Soap
 - Seventh Generation Natural Dish Liquid
- ### Household Cleaners
- Clorox Green Works Natural All-Purpose Cleaner
 - Clorox Green Works Natural Disinfectant Cleaner
 - Dr. Bronner's Sal Suds Cleaner

Products with High Levels of 1,4-Dioxane

Laundry Detergents

- Arm & Hammer
- Planet Ultra Liquid Laundry Detergent
- Era 2X Ultra
- Cheer Bright Clean Detergent
- Gain 2X Ultra
- Purex
- Tide Free
- Ivory Snow Gentle
- Tide
- Tide® Original Scent
- Tide® Free & Gentle (fragrance free)

Shampoos

- Gerber Grits & Giggles
- Gentle & Mild Aloe Vera Baby Shampoo
- Johnson's Kids Shampoo
- Watermelon Explosion
- Clairol Herbal Essences Rainforest Flowers Shampoo
- Clairol Herbal Essences Drama Clean Refreshing Shampoo
- Grandpa's Pine Tar Shampoo
- Head & Shoulders 2 in 1 Classic Clean Dandruff Shampoo+Conditioner
- Pantene Pro-V Moisture Renewal Shampoo
- Sea-Chi Organics Tasmanian Lavender Shampoo

Body Wash

- Johnson's Head-to-Toe Baby Wash
- American Girl Real Beauty Inside and Out Shower Gel - Apple Blossom
- Gentle Natural's Eczema Baby Wash
- Disney Clean as Can Bee Hair & Body Wash
- American Girl Hopes and Dreams Glistening Shower and Bath Wash
- Olay Complete Body Wash with Vitamins
- American Girl Real Beauty Inside and Out Shower Gel - Sunny Orange
- Healthy Times Baby's Herbal Garden Honeysuckle Baby Bath
- Aura Cacia Natural Aromatherapy Bubble Bath
- Body Essence Ultra Moisturizing Tea Tree Oil Body Wash
- Olay Complete Body Wash with Vitamins (Normal Skin)

Dishwashing Soap

- Mrs. Meyer's Clean Day Liquid Dish Soap
- Palmolive Pure & Clear Sparkling Fresh Concentrated Dish Liquid

For More Information Contact:

Jane Crowley: jcrowley@eastham-ma.gov
 Edmarie Martinez-Rodriguez: emarod@bu.edu
 Wendy Heiger Bernays: whb@bu.edu

If you would like to learn more about 1,4-dioxane visit:

http://www.bu.edu/soh/files/2015/03/14-dioxane-reference-guide-7_2

5 13.pdf

1,4-Dioxane in Consumer Products

Edmarie Martinez-Rodriguez,
 Wendy Heiger-Bernays and Jane Crowley

Pamphlet prepared on: July 2015



Photo adapted from Cinco Vidas™
<http://cincovidas.com/wp-content/uploads/2015/02/History-image2.jpg>



Conclusions

- 1, 4 Dioxane is considered to be a “likely carcinogen” on EPA Contaminant Candidate List
- Municipal Water will eliminate potential exposure and protect public health
- We need to continue to protect our Municipal and Private Wells
- Best option....proactive consumer action to remove it from products to prevent pollution????

“Nothing in this world is worth having or worth doing unless it means effort, pain and difficulty”

Theodore Roosevelt 1915

