PRIVATE WELL STATUS UPDATE

A MHECH

associated with the Dayton Landfill Project



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YOUR PRESENTERS

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DEFINITIONS



VOCs (VOLATILE ORGANIC COMPOUNDS)

- Large class of chemicals that evaporate easily
- Paints & Coatings
- Adhesives
- Cleaning Products
- Refrigerants
- Fuels



PREVENTATIVE ACTION LIMIT (PAL)

- PAL = WATCH OUT
- Chapter NR 140, Wis. Adm. Code
- PAL is 10% of ES for cancer-causing substances
- PAL is 20% of ES for other health effects
- PAL is 50% of ES for aesthetic or public-welfare concerns





ENFORCEMENT STANDARD (ES)

- ES = TAKE ACTION
- Chapter NR 140, Wis. Adm. Code
- Standard established for all substances of health concern, and those that might cause taste, color, odor, or other public welfare concerns.



BACKGROUND



- 1970 1990 landfill in operation
- 1990 landfill closed & capped with DNR-approved cover system (sand, clay, topsoil)
- 1988 1996 onsite wells monitored for standard indicator parameters (no VOCs)
- 1996 VOCs scanned for the first time, and detected in all of the onsite monitoring wells
- 1996-1999 WDNR sampled private water-supply wells - VOCs present
 - 2000 groundwater investigation begun



SAMPLING PLAN



2011 - WDNR Approved a more fluid sampling and analysis plan that allows the monitoring frequency of wells and private wells to be changed based on long-term VOC trends.

Condition	Frequency	Decision Threshold	Action
ıА	Quarterly	No VOC <mark>ES</mark> for 4 Rounds	Move to 1B
ıВ	Semi-Annual	No VOC PAL for 4 Rounds	Move to 1C
ıC	Annual	No VOC PAL for 2 Rounds	Move to 1D
ıD	5 Year		

Frequency moves up or down based on each monitoring event





SAMPLING PLAN JULY 2016

DAYTON LANDFILL WAUPACA COUNTY, WISCONSIN

Legend



- 27 monitoring wells
 3 staff gauges
- 30 private wells 6
- 6 gas probes

• 26 gas vents

HYDROGEOLOGY 101







GROUNDWATER MOVEMENT - Direction





GROUNDWATER MOVEMENT -Rate



mi-tech



GROUNDWATER MOVEMENT -Dayton

Dayton groundwater moves at 0.8 to 0.9 feet per day

(2001 Groundwater Investigation Report CWE, Inc.)

mi-TECH

What does o.8-o.9 ft/day look like?



GROUNDWATER MOVEMENT - in the real world (e.g. Dayton)

Glacial sediments

Complex layers of sand, gravel, clay, silt

 Controls horizontal & vertical groundwater movement



THE DAYTON GROUNDWATER MONITORING NETWORK





WATER QUALITY



COMPOUNDS OF CONCERN	2001		2008		2015/2016	
	MW	PW	MW	PW	MW	PW
Vinyl Chloride	X	X	X		X	
Iron	X	X	X	X	X	
Manganese	X		X	X	X	
Methacrylonitrile	X					
Methyl Methacrylate	X					
Antimony	X		X			
Bis (2-Ethylhexyl) Phthalate	X		X		X	
Arsenic	X	X	X	X	X	X
Methylene Chloride	X	X	X	X		
Nitrate + Nitrite	X	X	X	X	X	X
Lead	X	X	X			
Bromodichloro-methane		X				
Chloromethane		X				
Tetrahydrofuran			X		X	
Trichloroethane				X	X	
TOTAL	6/5	2/6	5/5	2/4	4/4	0/2

IRON

Primary Source:	Native soils, bedrock
Health Risk:	None
Concerns:	High levels cause offensive taste, odor, color, corrosion, foaming, or staining



Iron Detections in Private Wells - 2001 to Present



MANGANESE

Primary Source:	Native soils, bedrock
Health Risk:	None
Concerns:	High levels cause offensive taste, odor, color, corrosion, foaming, or staining



Manganese Detections in Private Wells - 2000 to Present



ARSENIC

Primary Source:

Health Risk (long-term exposure above the ES):

Native soils, bedrock

Cancer of the skin, lungs, urinary bladder, and kidney, skin pigmentation changes and thickening



Arsenic Detections in Private Wells - 2000 to Present



NITRATE + NITRITES

Primary Source:

Health Risk (long-term exposure above the ES): Diuresis, increased starchy deposits and hemorrhaging of the spleen

Fertilizers, septic systems



Nitrate + Nitrite Detections in Private Wells - 2000 to Present



METHYLENE CHLORIDE (DICHLOROMETHANE)

Primary Source:

Health Risk (long-term exposure above the ES): PVC Cement, plumbing applications, solvent

headaches, dizziness, nausea, and memory loss



Methylene Chloride (Dichloromethane) Detections in Private Wells - 2000 to Present



CHLORINATED SOLVENTS (PCE Breakdown)



TETRACHLOROETHYLENE (PCE)



Primary Source:

Dry-cleaning products

Health Risk (long-term exposure above the ES): Liver problems, may increase risk of getting cancer



Tetrachloroethylene (PCE) Detections in Private Wells -2000 to Present



TRICHLOROETHYLENE (TCE)



Primary Source:

Metal de-greaser, breakdown of PCE

Health Risk (long-term exposure risk of getting cancer above the ES):

Liver problems, may increase



Trichloroethylene (TCE) Detections in Private Wells - 2000 to Present



Cis – 1, 2 DICHLOROETHYLENE (DCE)



Primary Source:

Metal de-greaser, breakdown ofTCE

Health Risk (long-term exposure risk of getting cancer above the ES):

Liver problems, may increase



Cis – 1, 2 Dichloroethylene (DCE) Detections in Private Wells - 2000 to Present





VINYL CHLORIDE

Primary Source:

PVC pipes, breakdown of DCE

Health Risk (long-term exposure above the ES): Liver problems, may increase risk of getting cancer



VINYL CHLORIDE

- Laboratory detection limit is above the PAL and just below the ES
- Data only shows hits above the ES
- No ES in private wells
- Future lower detection limits



Vinyl Chloride Detections in Monitoring Wells

- 2000 to Present



MONITORING the BREAKDOWN of CHLORINATED SOLVENTS



CHLORIDE

- Chloride released as PCE, TCE, DCE, VC break down
- If greater than 2x background = breakdown of chlorinated solvents

(source MPCA 2006)



MI-TECH

Chlorido	Private Wells (upgra	- Background adient)	Private Wells - Impacted (downgradient)		
Median	2010	2015	2011	2016	
(ppm)	6.1	6.8	17.0	16.0	
			3x	2X	

ALKALINITY

- Measure of water's ability to neutralize acids
- Related to hardness and pH
- CO2 released as vinyl chloride breaks down



(source MPCA 2006)

- CO2 interacts with groundwater results in higher alkalinity
- Greater than 2x background = vinyl chloride breakdown

Alkalinity	Private Wells - Background (upgradient)			Private Wells - Impacted (downgradient)		
Median	2007	2010	2015	2007	2011	2016
(ppm)	140	150	150	450	430	460
				3x	3x	3x

PUTTING IT IN PERSPECTIVE

 The groundwater quality found in the private well with the most landfill impacts (N1958 Evergreen), poses <u>less</u> risk to human health than do most public water supplies

 Example – comparison of N1958 Evergreen to Waupaca municipal water system



ANALYTE	ES	N1958 Evergreen (2000-2016)	N1958 Evergreen (2016)	Waupaca Water (2000-2016)
Bromodichloromethane	6o ppb	ND	ND	1.0
Chloroform	6 ppb	ND	ND	2.3
Chloromethane	зо ррр	0.41J	ND	0.26
Tetrachloroethylene	5 ppb	ND	ND	2.6
1,1,1—Trichloroethane	200 ppb	0.4	ND	1.0
Toluene	8oo ppb	ND	ND	0.17
Methylene Chloride (Dichloromethane)	5 ppb	1.1	ND	0.29
Chloride	250 ppm	28.0	25.0	96
Arsenic	10 ppb	4.6	3.9	1.3
Nitrate + Nitrite	10 ppm	0.48	ND	9.1

LITTLE HOPE DAM REMOVAL







WHERE DO WE GO FROM HERE?



RECOMMENDATIONS

- The existing monitoring well network is adequate to protect human health & the environment
- All trends are decreasing
- No impact from removal of Little Hope Dam
- Continued Monitored Natural Attenuation
 - Natural breakdown
 - Dilution
 - Dispersion



Thank You!

