

# History of Groundwater Contaminant Assessment and Management around Closed Landfills

Ingrid Verhagen

MGWA Spring Conference – 26 April 2018

# Outline

## What is the Closed Landfill Program?

1970s-Indicator parameters and Two page permits

1980s-VOC method, update to the Solid Waste Rules

1990s-Improved Sampling Method, Presumptive Remedy

2000s-Contaminants of Concern broaden

Future Challenges

# Closed Landfill Program

*The Landfill Cleanup Act (115B.39) was enacted by the MN Legislature in 1994. Permitted Landfills could enter the Closed Landfill Program if they stopped accepting waste by April 1994; dropped all 3<sup>rd</sup> party lawsuits and turned over all insurance policies and Financial Assurance to the MPCA.*

*In return, the MPCA would cleanup, operate remediation systems and maintain the sites in perpetuity. The CLP provides these services at up to 112 sites. Sites are added to the program through amendments to the Act. Staff in the program includes project engineers, project hydrogeologists, construction managers, land managers, field representatives and support staff. The MPCA is the responsible party for all these sites.*

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 COURT REPORTER

Grant J. Merritt  
 JOSEPH P. DALYSH-P.E.  
 EXECUTIVE DIRECTOR

RECEIVED  
 FROM ANOKA CO.  
 MAR 27 1984

PERMIT FOR CONSTRUCTION AND OPERATION OF  
 SOLID WASTE DISPOSAL SYSTEM  
 Waste Disposal Engineering Sanitary Landfill

MINN. POLLUTION  
 CONTROL AGENCY

Pursuant to authorization by the Minnesota Pollution Control Agency, and in accordance with the provisions of Minnesota Statutes, Chapters 115, 116 and 473D, as amended and Agency Regulations SW 1-11, plans are approved and a permit is hereby granted to Waste Disposal Engineering, Incorporated, St. Paul, for construction and operation of a solid waste disposal system in Section 27, T32N, R24W, Grow Township, Anoka County, subject to the conditions given below.

The system consists of a sanitary landfill within a limited access area, operation equipment and other facilities. The site consists of approximately 114 acres. The facilities and operating procedures are further described in a permit application dated December 4, 1970, with plans, informational material and additional material received through March 23, 1971, all prepared under the direction of Mr. William K. McKie, P.E., Minneapolis. Development will be in conformance with the ultimate land use plans titled "Ultimate Grading" revised March 10, 1971 and "Land Use Plan" dated October 8, 1970, prepared under the direction of Mr. William McKie.

General Conditions

1. This permit shall not release the permittee from any liability or obligation imposed by Minnesota Statutes or local ordinances and shall remain in force subject to all conditions and limitations now or hereafter imposed by law. The permit shall be permissive only and shall not be construed as estopping or limiting any claims against the permittee, its agents, contractors, or assigns, nor as estopping or limiting any legal claims of the State against the permittee, its agents, contractors or assigns, for damage to State property, or for any violation of the terms of this permit.

2. No assignment of this permit shall be effective until it is executed in writing and signed by the parties thereto and thereafter filed with the Agency.

4. The use of the disposal system shall be in accord with and limited to the operation and/or disposal of the waste materials or substances described in the plans and/or permit application and associated material on file with the Agency.

5. This permit is subject without public hearing to modification or revocation, and may be suspended at any time for failure to comply with the terms stated herein or the provisions of any other applicable regulations or standards of the Agency or its predecessors, and is issued with the understanding that it does not estop subsequent establishment of further requirements for disposal or operation at any time or insertion of appropriate additional clauses herein at the discretion of the Agency if it is considered necessary in order to prevent or reduce possible pollution of the environment because of changed or unforeseen circumstances.

6. The permittee or assigns shall defend, indemnify and hold harmless the state of Minnesota, its officers, agents and employees, officially or personally responsible, against any and all action, claims or demands whatsoever which may arise from or on account of the issuance of this permit, or the construction, maintenance or operation of any facility hereunder.

7. The permittee will notify the Agency when construction is completed, and reports describing the types and quantities of waste disposal at this site shall be submitted to the Agency every month, together with other information on the operation of the disposal system.

8. The disposal system shall be operated at all times in accordance with any applicable regulations or standards of the Minnesota Pollution Control Agency now or hereafter adopted.

*Floyd J. Forsberg*  
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 Floyd J. Forsberg, P.E.  
 Director  
 Division of Solid Waste

*Grant J. Merritt*  
 \_\_\_\_\_  
 Grant J. Merritt  
 Executive Secretary & Chief  
 Executive Officer

Permit No. SW 28

Dated March 30, 1971

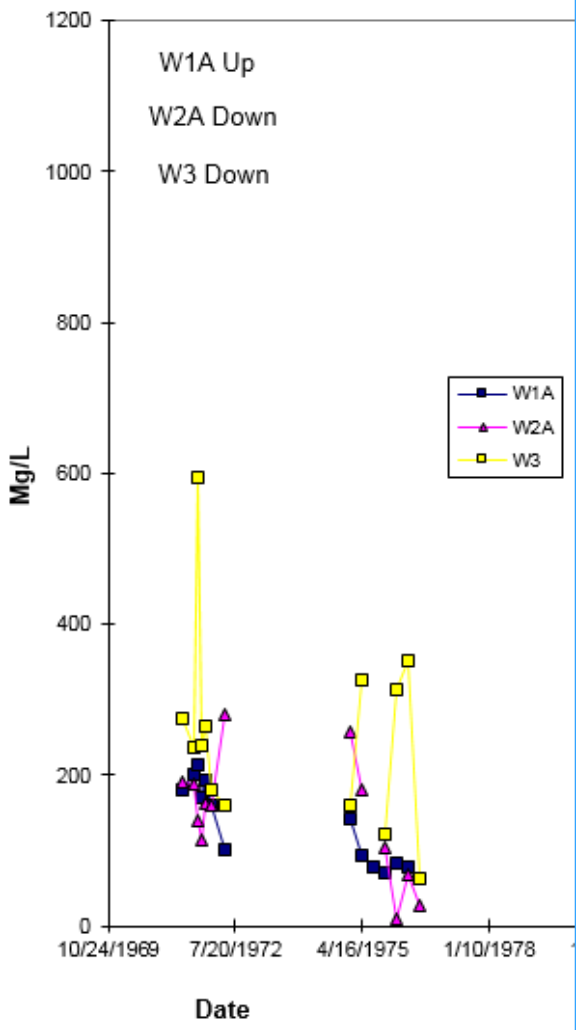
# Parameters Sampled in the 1970s

Monitoring wells were often limited because of the expanding working face: One upgradient of groundwater flow; one to two lateral to groundwater flow and one downgradient of groundwater flow.

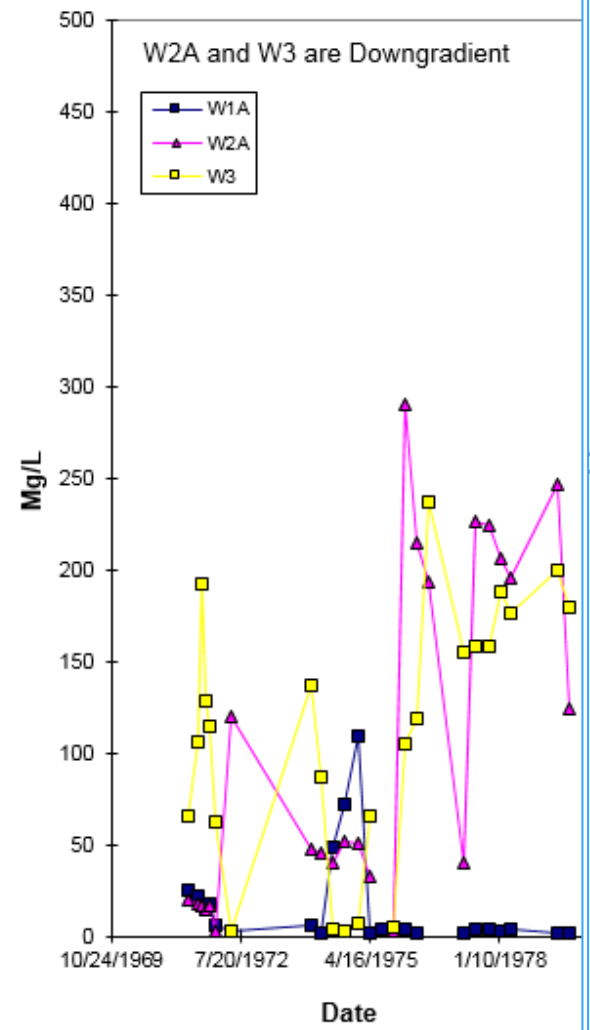
Parameters included:

- Alkalinity
- Chloride
- Conductivity
- Hardness
- Nitrate and Nitrite, as Nitrogen
- Sulfate
- pH
- Total Dissolved Solids

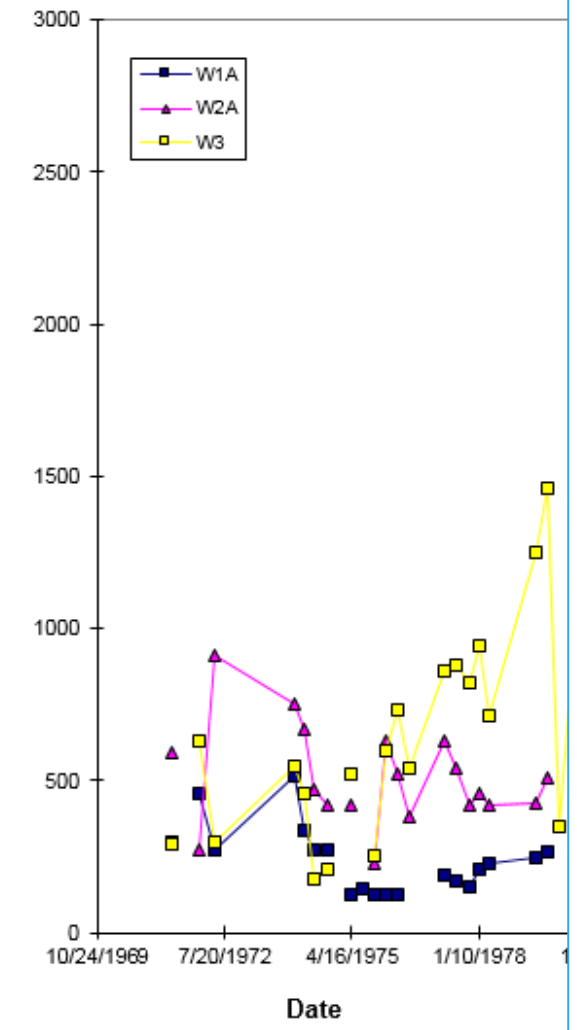
### Alkalinity



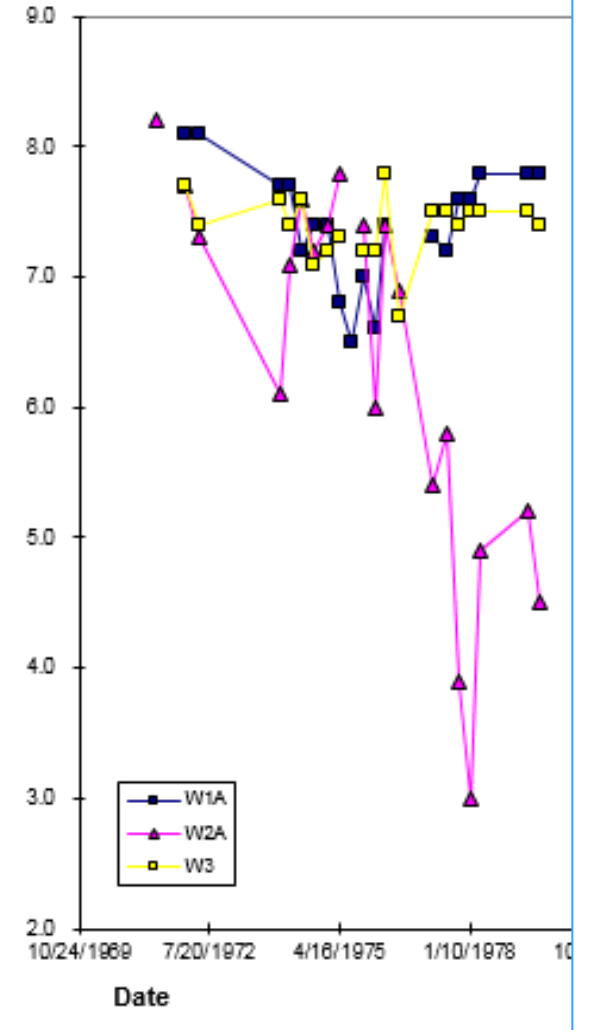
### Chloride



### Conductivity

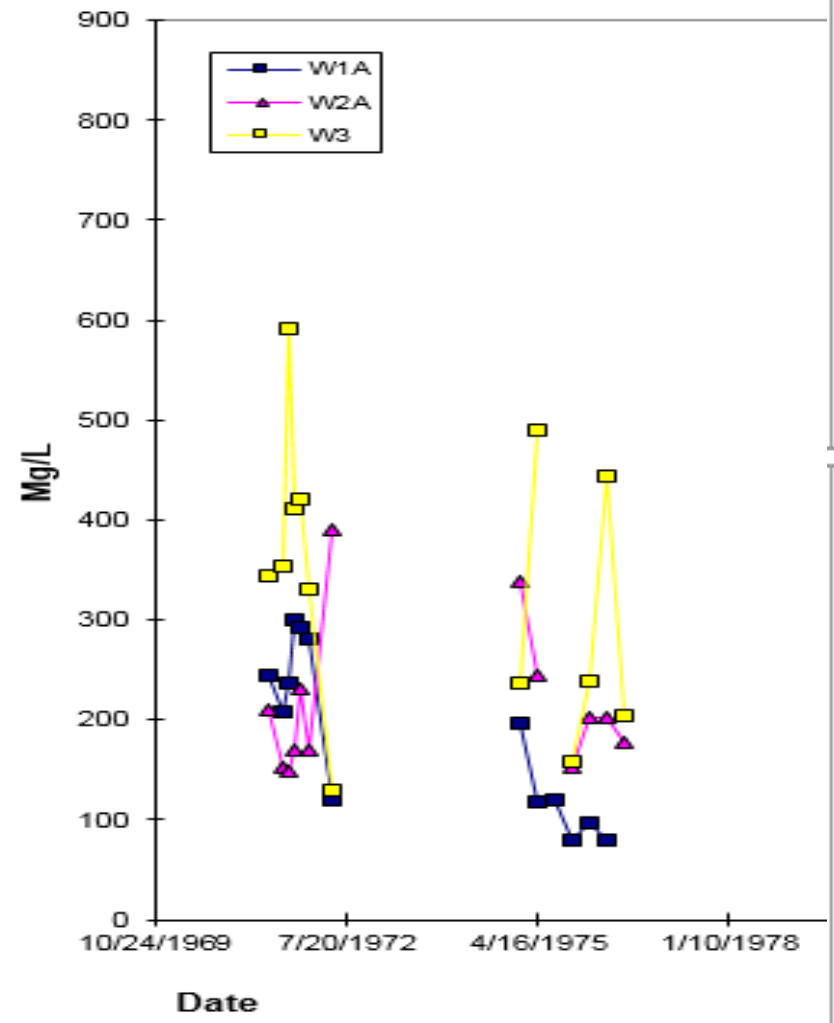


### pH

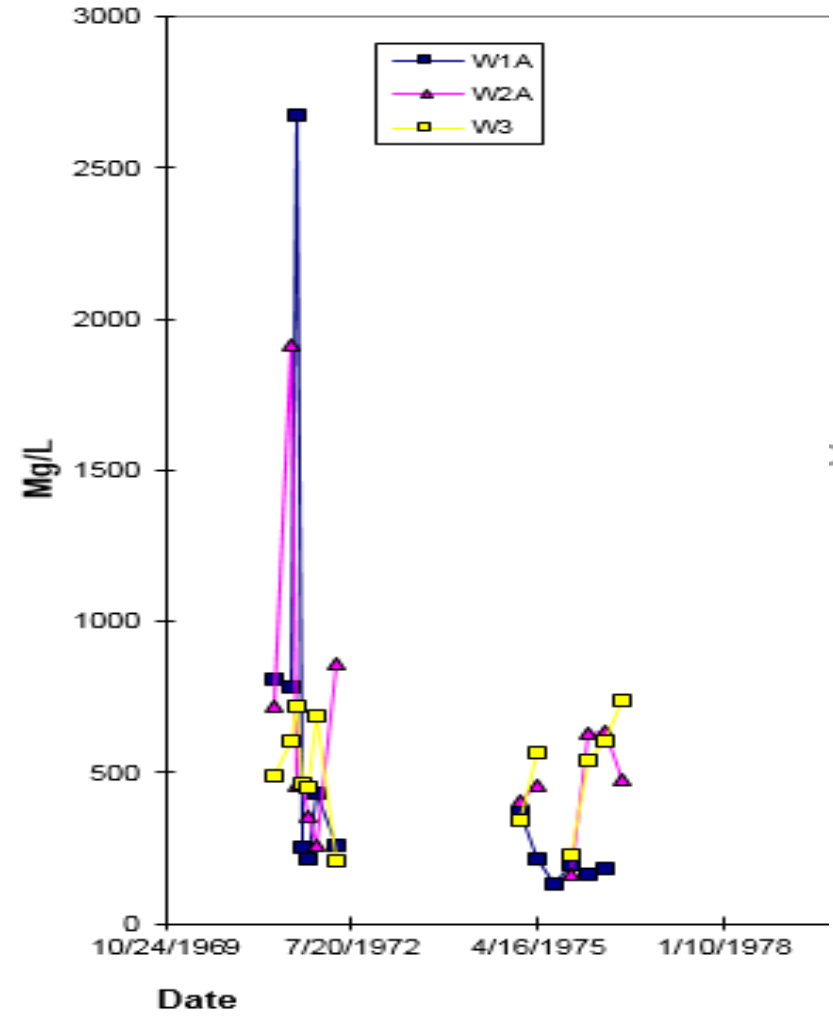


Trends during the 1970s

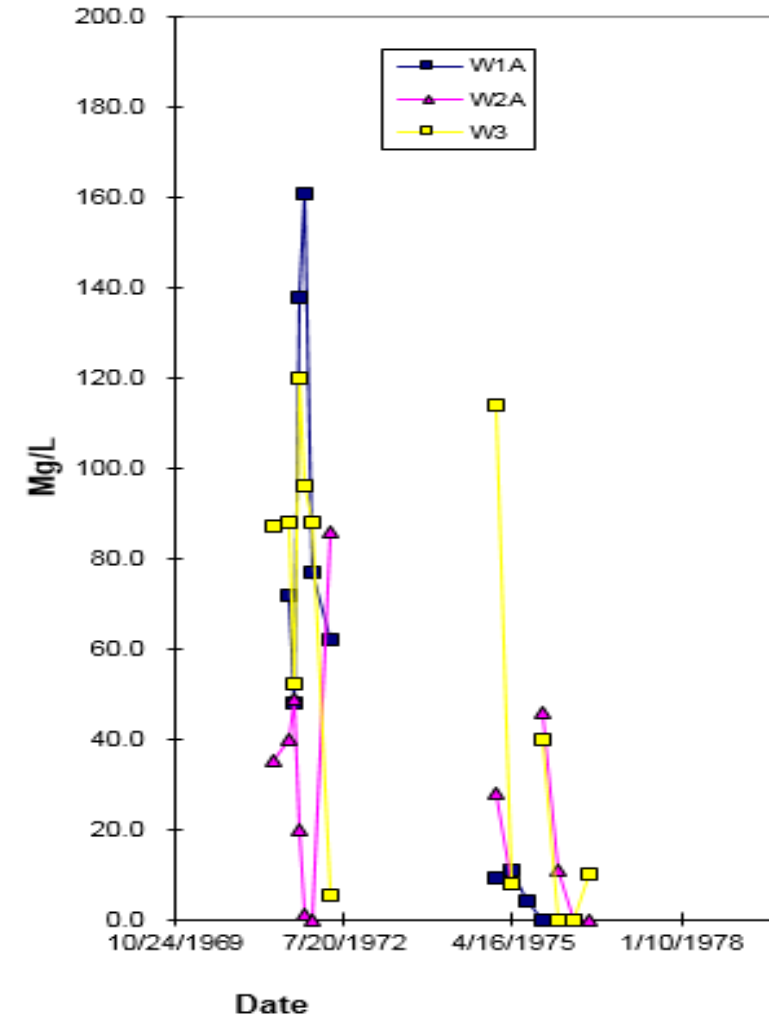
### Hardness



### TDS



### Sulfate



Trends during the 1970s



# Volatile Organic Compound Method Developed in 1980

A method to detect volatile organic compounds in groundwater was developed in the early 1980s. The method initially contained 26 compounds and currently contains 68 compounds

Detections over the years has depended on:

- Well Sampling Procedures
- Well Construction
- Holding Time
- Improved analytical instrumentation

PARAMETERNAME
Chloromethane
Methylene chloride
Tetrachloroethene
1,1-Dichloroethane
1,1-Dichloroethene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
1,1,2,2-Tetrachloroethane
1,2-Dichloropropane
1,2-Dichloroethene, trans
Vinyl chloride
Trichloroethene
Xylene, o
Ethylbenzene
Methyl isobutyl ketone
Acetone
Methyl ethyl ketone
Xylene, m
Xylene, p
Chlorobenzene
Chloroethane
Chloroform
Carbon tetrachloride
1,2-Dichloroethane
Toluene
Benzene



# Solid Waste Rules updated in 1988

The Solid Waste Rules were updated in 1988.

Permittees were to line their facilities and to test for volatile organic compounds, some metals and indicator parameters.

Intervention Limits were applied to analytical results with a compliance boundary developed around all open sites that defaulted to 200 feet from the waste boundary.

# Chemicals registered versus Methods to Detect Chemicals in Groundwater

80,000 chemicals are registered in the US.

Methods overlap and the number of methods are an order of magnitude less than the chemicals registered.

A method may test certain analytes but drinking water standards may be absent for those analytes should they be detected.

# Steps taken to improve Assessment and Remediate Groundwater

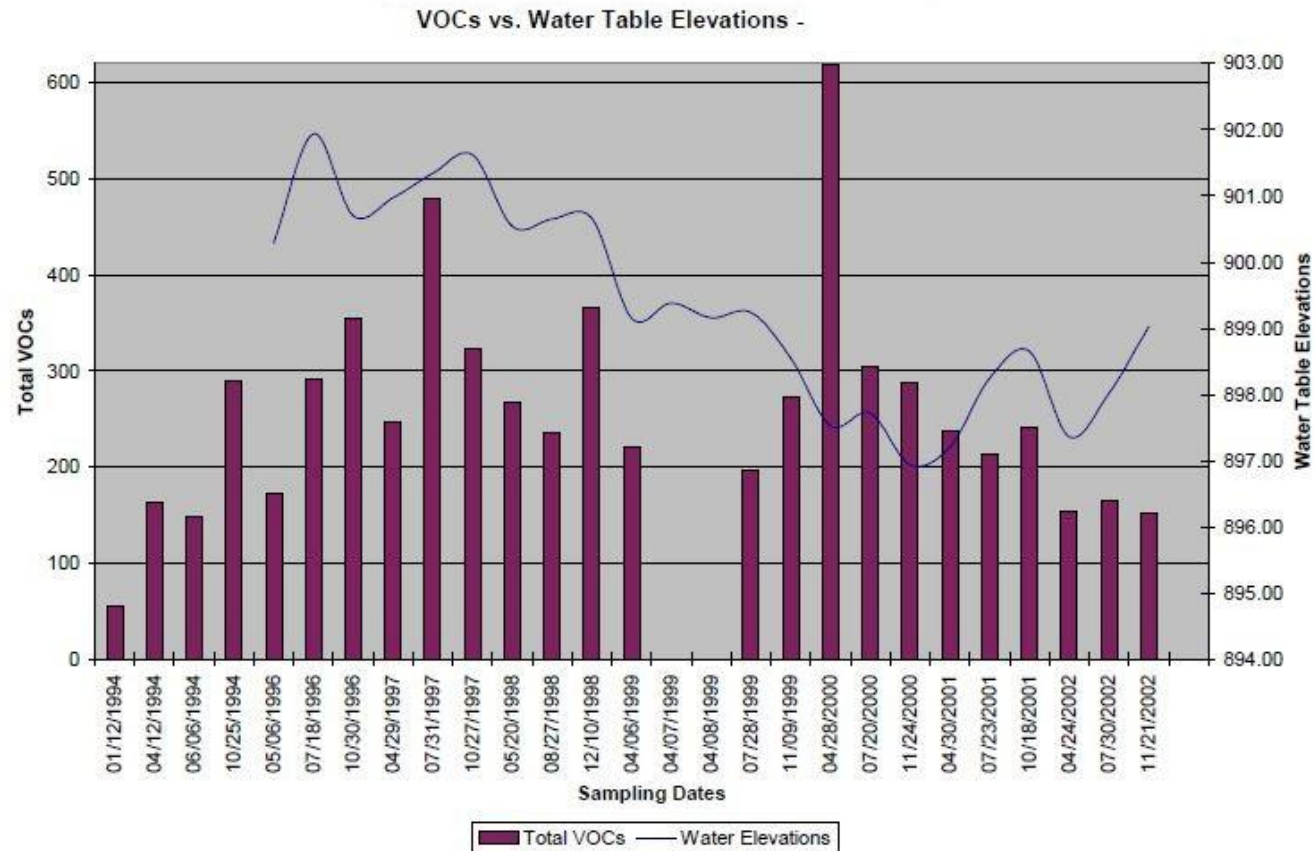
Dedicated Groundwater Sampling Pumps were installed in 1990s at all monitoring wells in the program to improve the collection of representative samples.

Presumptive Remedy of Installing Covers (and active LF gas extraction) that met the 1988 rules to reduce the amount of leachate generated as VOCs were found to be a problem at most closed landfills.

Program tests for Subtitle D parameters to keep pace with the expanding list of parameters tested at Open Solid Waste Sites.

Attenuation studied around Landfills.

# Common Trend with Presumptive Remedies



# Contaminant of Emerging Concern and other Unforeseen Contaminants

Perfluorochemicals discovered in 2004 in groundwater around a Closed Landfill.

More toxicological studies and better analytical methods and instrumentation:

- Standards drop for metals so the challenge becomes separating naturally occurring metals from metals released by acidic leachate.
- Standards drop for specific VOCs - what once was in compliance is now out of compliance.

# Contaminants of Emerging Concern

Personal Care Products, Pharmaceuticals have been detected and there is no method for removing them from groundwater.

1, 4 dioxane – method first created in the mid-2000s and now it is being detected around many closed landfills.

# Future Challenges

Monitoring Systems adequate to deal with the varied contaminants.

Future emerging contaminants of concern.

Vapor intrusion may become a factor.

Limited Funds and Limited Staff.

Educating the Public



# Thank you!

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