



# Groundwater

## Regulatory Decisions, Responses, and Resources

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# The Reality of Groundwater Monitoring

- Each sampling event is a decision point.
- There are often more than one option available.
- Good data is critical.
- There are resources to assist you.



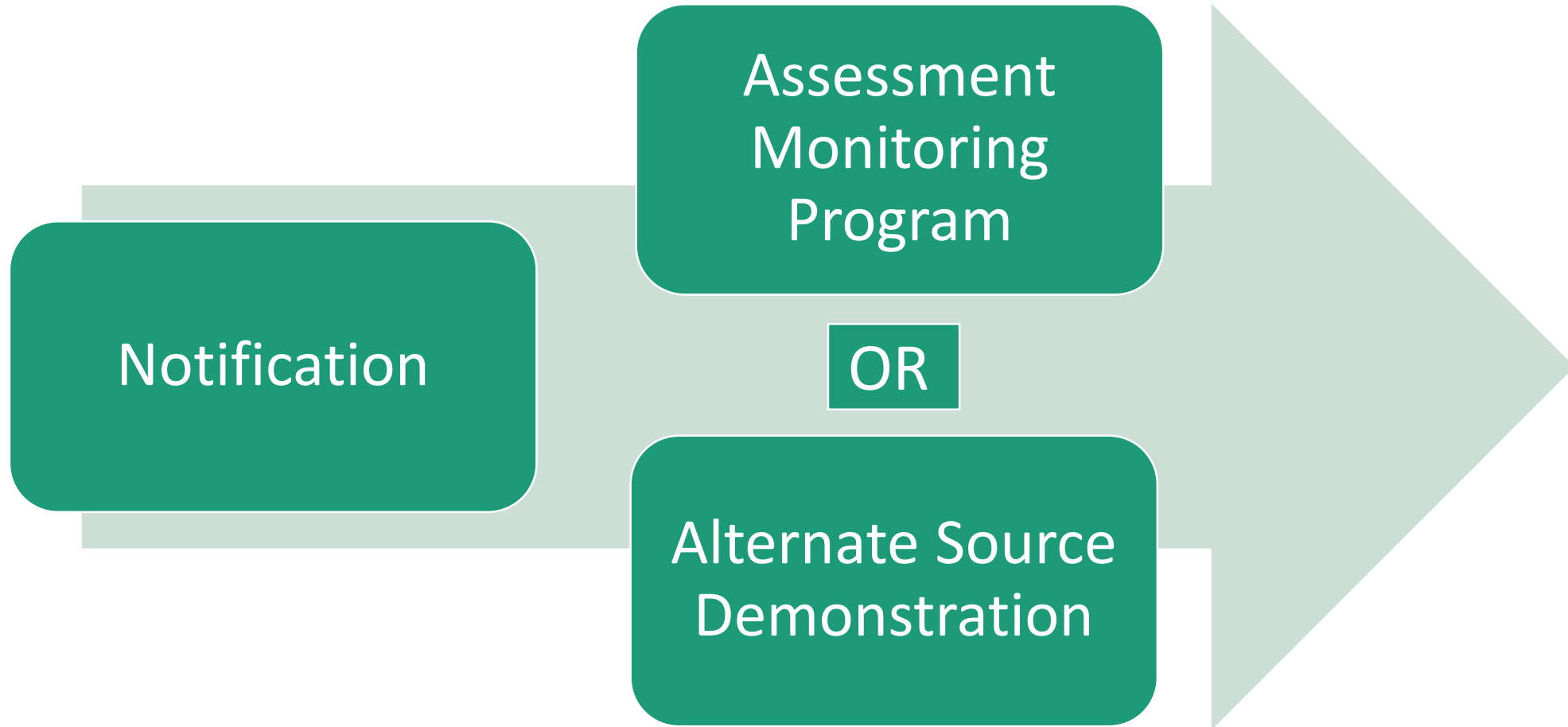
## Scenario 1 – Sanitary Landfill

A sanitary landfill conducts a detection monitoring program sampling event. The samples are sent off to the laboratory where they are analyzed for Table 3.1 Column A constituents. The results come back and the downgradient well data is compared to the site background. Based on this evaluation, it is determined there are SSI over background for several constituents.

What do we do?

# Detection Monitoring Program [9VAC20-81-250.B.2.]

## SSI over Background



## Verification Sampling [9VAC2-81-250.A.4.i.]



- Conducted when initial review of data suggests results might not be an accurate reflection of groundwater quality
- Must be within the 30-day evaluation period
- Does not alter the timeframes for determination and reporting of an SSI (background or GPS)

# Detection Monitoring Program [9VAC20-81-250.B.2.]

## SSI over Background

- Notify DEQ of SSI
  - Within 14 days of finding (44 days)
  - Include the following information:
    - Date of sampling event
    - Lab report date
    - SSI determination date
    - Constituents with SSI over background
    - Statement of how facility intends to proceed



# Detection Monitoring Program [9VAC20-81-250.B.2.]

## SSI over Background (Continued)

- Establish Assessment Monitoring Program [B.3.]
  - Within 90 days

OR

- Submit an Alternate Source Demonstration (ASD) [A.5.]
  - Within 90 days
  - Can be extended by Director for good cause



## Scenario 2 – Industrial Landfill

An industrial landfill conducts a first determination monitoring program sampling event. The samples are sent off to the laboratory where they are analyzed for Table 3.1 Column A constituents. The results come back and the downgradient well data is compared to the site background. Based on this evaluation, it is determined there are SSI over background for several constituents.

What do we do?

# First Determination Monitoring Program [9VAC20-81-250.C.2.] SSI over Background

- Verification sampling [9VAC2-81-250.A.4.i.] - Voluntary
- Notify DEQ of SSI within 14 days of finding (44 days)
- Establish **Phase II Monitoring Program** [C.3.] OR submit an Alternate Source Demonstration (ASD) [A.5.]

## Scenario 3 – Sanitary Landfill

A sanitary landfill conducts an assessment monitoring program annual sampling event. The samples are sent off to the laboratory where they are analyzed for Table 3.1 Column B constituents. The results come back. The well data is compared to the established groundwater protection standards (GPS). Based on this evaluation, it is determined there are SSI over GPS for several constituents.

What do we do?

# Assessment Monitoring Program [9VAC20-81-250.B.3.]

## Full Table 3.1 Column B Sampling Events



Column B Detect  
Notification

GPS Exceedance  
Notification

Characterization  
& Assessment  
OR ASD

# Assessment Monitoring Program [9VAC20-81-250.B.3.]

## Full Table 3.1 Column B Sampling Events

- Notify DEQ of Column B detects
  - Within 14 days
  - Include the following information:
    - Date of sampling event
    - Lab report date
    - Constituents detected
  - Should identify first time detected constituents
  - May want to include historic detect list
- Add first time detected constituents to the Column B detect list for future sampling events.

# Assessment Monitoring Program [9VAC20-81-250.B.3.]

## SSI over Groundwater Protection Standards (GPS)

- Verification sampling [9VAC2-81-250.A.4.i.] - Voluntary
  - Within 30-day evaluation period
- Notify DEQ of SSI
  - Within 14 days of finding (44 days)
  - Include the following information:
    - Date of sampling event
    - Lab report date
    - SSI determination date
    - Constituents have exceeded GPS
    - Statement of how the facility intends to proceed

# Assessment Monitoring Program [9VAC20-81-250.B.3.]

## SSI over Groundwater Protection Standards (GPS)

- Notify DEQ of SSI (continued)
  - Should:
    - Include wells associated with each constituent
    - Identify first time exceeding constituents
    - Identify wells that have not previously exceeded
- Undertake characterization and assessment [260.C.1.] OR submit an ASD [250.A.5.]
  - May need to update characterization and assessment or add first time exceeding constituents to COC list.



## Scenario 4 – Industrial Landfill

An industrial landfill conducts a Phase II monitoring program sampling event. The samples are sent off to the laboratory where they are analyzed for Table 3.1 Column A + Column B Detected constituents. The results come back. The well data is compared to the established GPS. Based on this evaluation, it is determined there are SSI over GPS for several constituents.

What do we do?

## **Phase II Monitoring Program [9VAC20-81-250.C.3.] SSI over Groundwater Protection Standards (GPS)**

- Verification sampling [9VAC2-81-250.A.4.i.] - Voluntary
- Notify DEQ of SSI within 14 days of finding (44 days)
- Undertake characterization and assessment [260.C.1.] OR submit an ASD [250.A.5.]

# Alternate Source Demonstration [9VAC20-81-250.A.5.]



- Basis
  - Source other than the landfill (natural variability, upgradient source, well or pump materials)
  - Error in sampling (field crew)
  - Error in analysis (laboratory staff)
  - Error in evaluation (statistical evaluation)
- ASDs are generally expensive and hard to do.

Facilities are highly encouraged to discuss ASDs with regional groundwater staff prior to submission.

## Alternate Source Demonstration (Continued)



ASD are not:

- Verification Sampling [9VAC2-81-250.A.4.i.]
- Non-performing wells [9VAC20-81-530.C.3. & Permit]

For more information, see Submission Instructions for Groundwater Alternate Source Demonstrations at Solid Waste Landfills ([LPR-SW-SI-19](#))

# Non-performing Wells [Permit]

- Notification
  - Within 30 days of finding
  - Includes site plan with proposed location of replacement
- Seal and abandon well
- Install replacement well prior to next sampling event unless extension granted by Director



# Alternate Point of Compliance (APC)



- An APC may be used to address a GPS exceedance.
  - The APC need to be approved within the 180-day period for characterization and assessment to stay in compliance.
- Facilities are highly encouraged to discuss APCs with regional groundwater staff prior to submission.
- For more information, see Submission Instructions for Groundwater Alternate Point of Compliance Variance Petitions ([LPR-SW-SI-22](#))



# The Reality of Groundwater Monitoring

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## Observed Data Issues

- Sampling, analysis, and QA/QC methods
- Repeated resampling
- Laboratory report revisions
- Limit of quantification (LOQ)/limit of detection (LOD) Variations
- Laboratory spikes



# Sampling, Analysis, and QA/QC Methods [9VAC25-81-25.a.4.b]

- DEQ observations
  - Non-SW-846 analytical methods used
  - Method holding time requirement not met
  - Method preservation requirements not met
  - Method requirement for no headspace not met
- The facility needs to work with its lab(s) to ensure methods are met.
- DEQ can require resampling.



## Repeated Resampling

- Missing or invalid data
- Issue should be identified and addressed inside the 30-day evaluation period

# Laboratory Report Revisions

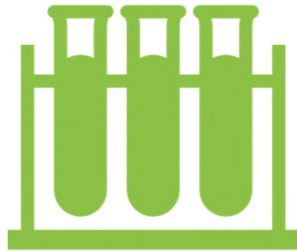
- Groundwater compliance dates depend on date the lab report issued.
- If the revision impacts the data evaluation, DEQ typically considers the lab revision date as the issuance date.
- Revisions should generally be within or reasonably close to the 30-day evaluation period.

# Laboratory Report Revisions (Continued)

- Why is the report being revised?
- DEQ observations
  - Data not reported
  - Data correction
  - Combine reports
  - Date correction
  - “Per client request”
- If “per client request,” the facility needs to ensure that a clear explain their request is included in their submittal.

# Limit of Detection (LOD) / Limit of Quantification (LOQ)

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## LOD

The lowest concentration of an analyte in a sample which can be detected, but not necessarily quantified as an exact value.



## LOQ

The lowest concentration of an analyte in a sample which can be quantitatively determined with suitable precision and accuracy.

# LOD/LOQ Variation

- How do the variations impact my evaluation and conclusions?
- Ideally, LOQ would be less than GPS.
- Variations may impact statistical evaluation.





# Laboratory Spikes

## Laboratory control sample (LCS)

- A sample prepared in the lab to contain analytes of interest at known concentrations (ideal conditions)

## Matrix spikes (MS)

- Actual field samples to which known concentrations of target analytes are added prior to testing (field conditions)

## Duplicates (D)

- Replicates of LCS or MS

## Laboratory Spikes

- Is my data potentially low or high bias?
- How do the results impact my evaluation and conclusions?
- Ideally, spike results would be inside the method's acceptable ranges.



# The Reality of Lab Data Issues

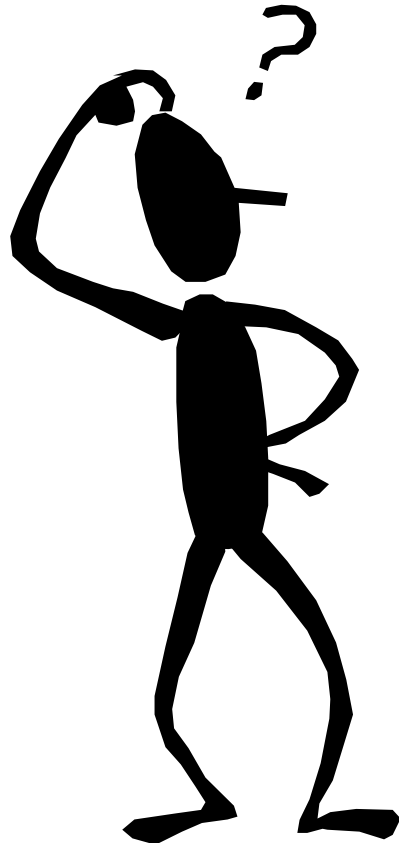
- DEQ does not have jurisdiction over the labs.
- The facility is responsible for the final groundwater data submitted to DEQ as being an accurate representation of the aquifer conditions.
- If in doubt, ask about data qualifications and qualifiers.

## Online Resources

- DEQ Solid Waste Facility Requirements and Guidance
  - Groundwater Monitoring
  - Solid Waste Alternate Concentration Limits (ACL)
  - Groundwater Frequently Asked Questions
  - Groundwater Submission Instructions
  - Technical Review Checklists
- Virginia Regulatory Town Hall (DEQ Virginia Waste Management Board)
  - Agency guidance including submission instructions

## Online Resources (Continued)

- [LIS Virginia Law \(9VAC20-81\)](#)
  - 9VAC20-81-250. Groundwater monitoring
  - 9VAC20-81-260. Corrective action program
- [EPA SW-846 Compendium](#)
  - Everything SW-846
- [RCRA Online](#)
  - Federal regulations



Questions?