Groundwater Monitoring for Closed Landfills and Surface Impoundments

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OUTLINE

- Sites that require groundwater monitoring
- What triggers need for monitoring?
- Groundwater monitoring plan
  - Locations
  - Depths
  - Frequency,
  - Parameters
- Drilling and Completions for Wells
- Measurements for wells
- Statistics
- Report Contents
- Well Redevelopment
- Post-Closure Requirements

What is Groundwater Monitoring?

- Collecting and analyzing groundwater samples from wells installed into the subsurface beneath a facility.
- Monitoring groundwater quality beneath a permitted unit.
- Ensure permitted units not emitting constituents of concern to groundwater.

How is Groundwater Monitoring Managed?

- The Sampling and Analysis Plan (SAP) in the SW or HW Permit.

- SAP contains all requirements of regulations for monitoring.

When Units Require Monitoring?

- Solid Waste
  - Type I
  - Type II Facility
  - Surface Impoundments, Landfills, Landfarms
- Hazardous Waste
  - Surface Impoundments
  - Land Treatment Units
  - Landfills
  - Waste Piles

When does Monitoring Occur?

- For the entire operational life of the facility.
- For a post-closure period of 30 years.
- Post-Closure Period may be shortened or lengthened by Administrative Authority.

Units and Facilities Monitored

- Landfills
- Landfarms
- Surface Impoundments
- Waste Piles
- Industrial and Municipal Facilities

Monitoring Programs

- Detection
- Assessment (Solid Waste)
- Compliance (Hazardous Waste)
- Corrective Action

Monitoring Wells

- Sufficient number of wells installed at appropriate depth(s) to yield groundwater samples from uppermost aquifer.
- Minimum three wells (1 up gradient and 2 down gradient).
- Installed in at least uppermost permeable zone. May have wells installed in second zone.

Well Installation Handbook

- LDNR/LDEQ Guidance Manual for Environmental Boreholes and Monitoring Systems
- Replaced the LDOTD/LDEQ “Green Book”
- Guide for drilling, installing, and plugging and abandoning wells

Groundwater Monitoring Plan

- Groundwater Sampling and Analysis Plan

- Contains sampling methods, sampling parameters, groundwater wells, QA/QC procedures, statistical information/GWPS, reporting information

- This is the guide for sampling event and used for review of groundwater reports

Monitoring Parameters

- Parameters to be monitored during events.
- Parameters to be based on waste characterization and facility operations
- Semiannual and Annual Events

Monitoring Frequency and Reporting

- Semiannual and Annual
- Reports submitted 90 days after each sampling event
- HW Annual Report due March 1st
- Some exceptions to the rule

Well and Water Depths

- Measure well depths at each sampling event
- Determine if well screens blocked and need to be redeveloped
- Measure well depths prior to purging at each event
- Used to develop potentiometric maps

Purging and Sampling Methods

- Purge prior to sampling removing three well volumes
- Do not purge to dryness
- Submersible Pump, Low Flow Pump, Peristaltic Pump, Bladder, Bailer
- Sample within 24 hours of purging

Statistical Analyses

- Statistical analyses required during detection monitoring
- Interwell vs Intrawell
- Prediction, Tolerance, Control Chart Methods
- Statistically Significant Increases (SSIs)

GWPS

- Calculated standard used in Assessment to ensure constituents in Groundwater are protective of human health and the environment
- Utilizing RECAP
- Use Site-Specific Data to calculate standards

Laboratory Report and Summary Tables

- Create Summary Tables for Well Construction Information including Measured Well Depths
- Summary Table for Laboratory Results
- Laboratory Report

Monitoring Reports

- Geology and Groundwater Requirements listed in permit
- Short site summary
- Summary of sampling event
- SSIs or exceedances and path forward

Well Redevelopment

- Wells need to be redeveloped over time.
- Initial development is when well is installed.
- As well screen become silted in, well should be redeveloped to removed sediment from well screen

Maintenance and Inspections

- Inspections shall occur at a maximum of at least every 6 months.
- Monitoring wells shall be locked, maintained, bollards upright, casing and pad in good condition.
- Grass should be maintained around the wells.
- No chemicals for grass treatment or pest treatment should be utilized.
- The LDEQ will also inspect the monitoring wells on a yearly basis.

Differences for Monitoring between Operating and Post-Closure Period

- Facility designs program in Operating Period
- Monitoring continues until end of post-closure period.

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