

Groundwater Assessment Monitoring

Technical Memorandum 18.04

June 2018

Alaska Department of Environmental Conservation
Division of Environmental Health
Solid Waste Program



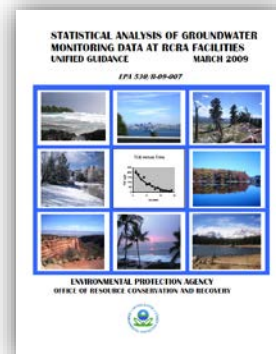
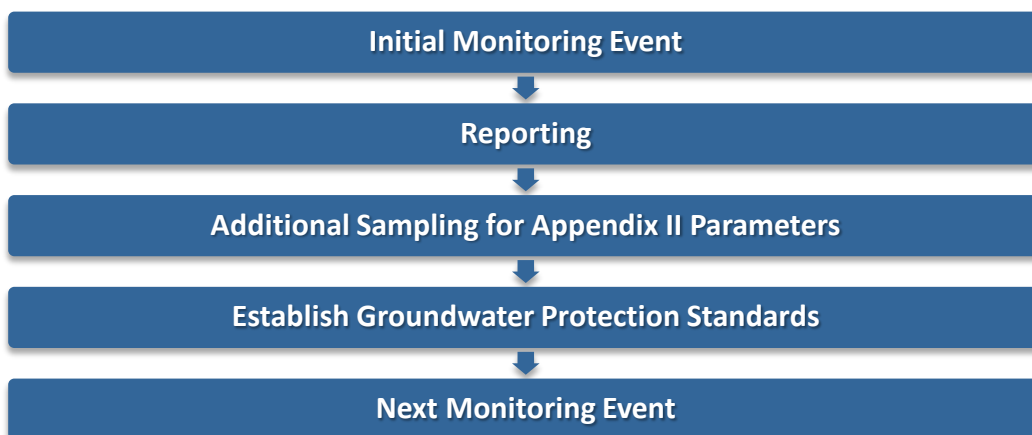
Assessment Monitoring for groundwater is required when evidence suggests that a landfill is impacting groundwater quality downgradient of the landfill. The impact is demonstrated when reliable statistical evidence indicates that the measured concentration of one or more constituents has increased over the background concentration. The purpose of Assessment Monitoring is to assess the nature of any contaminants and the extent to which they affect groundwater. This initially includes all wells at a landfill, but can be limited to the subset of landfill wells near the impacted area once the extent of the contamination is determined.

Statistical Increase Over Background

Any statistical increase over background concentrations (an exceedance) must be reported in writing to the Alaska Department of Environmental Conservation (ADEC) within **14 days of the landfill owner/operator receiving the monitoring results** [Title 18, Chapter 60, Section 850(c) of the Alaska Administrative Code (18 AAC 60.850(c))]. However, only a confirmed exceedance will trigger assessment monitoring. The EPA document *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance* (Unified Guidance) recommends using a retesting strategy to confirm whether an apparent statistical exceedance is reliable. The details of a retesting strategy must be included in the monitoring plan/quality assurance project plan (QAPP) for groundwater monitoring, and the intention to implement the strategy must be reported at the time of the initial exceedance. In such a case, an exceedance will not trigger assessment monitoring until the designated retesting events confirm the exceedance. **A single exceedance is a confirmed exceedance if the QAPP does not include a retesting strategy.**

In addition, an exceedance may not trigger assessment monitoring if the owner/operator can demonstrate, within 90 days that the exceedance is caused by a source other than the landfill, an error in sampling or analysis, an error in statistical evaluation, or natural variation in groundwater quality. [18 AAC 60.850(c)(3)].

The procedure for assessment monitoring, when triggered, is as follows:



Chapter 19 of the Unified Guidance discusses the details for implementing a retesting strategy for detection monitoring.

Section 4.3 of the Unified Guidance discusses the factors to assess in a demonstration that an exceedance is not the result of a contaminant release from the landfill.



Initial Monitoring Event

Within 90 days, sample and analyze all downgradient monitoring wells for all constituents listed in Appendix II of Title 40, Part 258 of the Code of Federal Regulations (40 CFR 258). Sampling background wells during this event is recommended to provide additional data that will be required to establish background concentrations for Appendix II parameters.



Reporting

Within 14 days of the date on the final analytical laboratory report, provide ADEC with a list of all Appendix II compounds detected above their detection limit.



Additional Sampling for Appendix II Parameters

For any additional constituent detected in the downgradient wells, four independent rounds of sampling and analysis for all wells must be performed to establish a statistical background value. The regulations require that the sampling events occur prior to the next scheduled monitoring event. However, based on site-specific conditions, ADEC may approve an alternate sampling schedule that will allow up to twelve months to complete the minimum four monitoring events following the identification of the detection.



Establish Groundwater Protection Standard (GWPS)

In assessment monitoring, sampling results are statistically compared to the applicable GWPS. The GWPS is determined based on the following hierarchy:

1. The Federal drinking water maximum contaminant level (MCL) under 40 CFR 141.
2. When no standard is available in 40 CFR 141, a statistically-derived background value or other health-based levels approved by ADEC may be used as the GWPS.
3. If the background concentration exceeds these standards, the GWPS will be a statistically-derived background concentration [Unified Guidance, Chapter 5].



Next Monitoring Event

Within 90 days of the initial monitoring event, sample all wells and analyze for all 40 CFR 258 Appendix I parameters, additional required parameters, and any Appendix II parameters ever detected at the facility.

Long-term Assessment Monitoring

Within 60 days of completing the four sampling events to establish background, the owner/operator must establish a long-term monitoring program, and update the QAPP, accordingly. Monitoring events must occur according to the schedule approved by ADEC, which will include **at a minimum**:

- One event annually where all wells are sampled for all Appendix II and additional required parameters.
- One or more separate events where all wells are sampled for Appendix I, additional required parameters, and all previously detected Appendix II parameters.

Statistical Comparisons in Assessment Monitoring

For each parameter sampled in downgradient wells, the result is statistically compared to the established GWPS to determine if the constituent exceeds its GWPS. In addition, statistical comparison of results to background concentrations is necessary to continue to evaluate for additional exceedances or to confirm that concentrations have returned to background levels. Any GWPS that is based on a statistically-derived background concentration and other background statistical analyses needs to be evaluated and updated based on the

Requirements Based on Sampling Results and Analysis

If any new Appendix II constituents are detected:

- Notify ADEC within 14 days of the date on the final analytical laboratory report.
- Establish statistically-derived background concentrations - Federal regulation requires four independent samples from each background well. Existing data from the most recent four years of background well sampling may be used to meet this requirement.
- Establish a GWPS for comparison.

If the measured concentration of any Appendix II constituent statistically exceeds the GWPS:

- Notify ADEC within 14 days of the owner/operator receiving the monitoring report.
- Install at least one new permanent monitoring well at the facility boundary in the direction of the contaminant migration that will be included in the monitoring program.
- Characterize the nature and extent of the release by installing additional wells, as necessary.
- If the extent of the plume has migrated beyond the facility boundary, notify all property owners whose land overlies the plume.
- Initiate an assessment of corrective measures. [40 CFR 258.56]

If the concentration of any Appendix II constituent statistically exceeds background but no concentration statistically exceeds the GWPS:

- Continue assessment monitoring

statistical approach and monitoring frequency.

Chapter 7 of the *Unified Guidance* recommends the use of statistical confidence intervals for comparisons to the GWPS. It is important to understand the statistical basis of the GWPS used for each constituent so that the confidence interval is calculated using the same statistical basis, as per the following:

- If the fixed standard represents an average concentration, then the *mean* concentration in groundwater should not exceed the limit.
- If the fixed standard represents a not-to-exceed value or an *upper percentile* concentration, compare maximum values. The number of individual results that exceed the specified confidence interval shall not exceed the alpha (α) limit.

References

- ADEC. 18 AAC 60. Solid Waste Regulation
- EPA. 40 CFR Part 258.55 – Assessment Monitoring Program
- EPA. 40 CFR Part 258.56 – Assessment of Corrective Measures
- EPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance. https://www.itrcweb.org/gsmc-1/Content/Resources/Unified_Guidance_2009.pdf
- ITRC (Interstate Technology & Regulatory Council). 2013. Groundwater Statistics and Monitoring Compliance, Statistical Tools for the Project Life Cycle. GSMC-1. Washington, D.C.: Interstate Technology & Regulatory Council, Groundwater Statistics and Monitoring Compliance Team. <http://www.itrcweb.org/gsmc-1/>.