Water Monitoring at Class I & II Municipal Solid Waste Landfills (MSWLFs)

Alaska Department of Environmental Conservation (ADEC)
Solid Waste Program
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3 Classes of Landfills in Alaska

• **Class I**
  • ≥20 tons/day based on annual average
  • Requires liner, leachate management & monitoring

• **Class II**
  • < 20 tons/day based on annual average
  • Not connected by road to Class I OR >50 miles from Class I
  • Requires monitoring (>25” precipitation/year)
  • No burning of waste

• **Class III**
  • Not connected by road to Class I Landfill OR >50 miles from Class I
  • < 1 ton ash/day on annual average
  • < 5 tons/day based on annual average
  • Monitoring *not* required
  • Controlled waste burning allowed
9 Class I Landfills

- Anchorage Regional Landfill (306,723 tons/year, 2014)
- Fairbanks North Star Borough Landfill (91,000 tons/year, 2014)
- Oxbow (Prudhoe Bay) Landfill (90,000 tons/year, 2011)
- Soldotna Central Peninsula Landfill (62,737 tons/year, 2014)
- Palmer MSB Central Landfill (82,939 tons/year, 2014)
- Kodiak Island Borough Landfill (13,231 tons/year, 2014)
- Unalaska Landfill (7,300 tons/year, 2013)
- Fort Wainwright Landfill (C&D monofill)*
13 Class II Landfills

- Barrow Landfill
- Kotzebue Landfill
- Nome Beam Road Landfill
- Bethel Landfill
- Dillingham Landfill
- Naknek Bristol Bay Borough Landfill
- Fort Greely Landfill
- Delta Junction Landfill
- Denali Borough Landfill
- Glennallen Landfill
- Valdez Balefill and C&D Landfill
- Cordova Mile 17 Landfill
- Eareckson Air Station (Shemya) Landfill*
Water Monitoring at Class I & II Municipal Solid Waste Landfills (MSWLFs)

• Why consistent data collection matters for long-term monitoring at Class I & II MSWLFs

• What it takes to make informed & defensible management decisions

• Where do we go from here
40 CFR 258.53
Ground-water sampling and analysis requirements

(a) The ground-water monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide an accurate representation of ground-water quality at the background and downgradient wells installed in compliance with §258.51(a) of this part.

(b) The ground-water monitoring program must include sampling and analytical methods that are appropriate for ground-water sampling and that accurately measure hazardous constituents and other monitoring parameters in ground-water samples. ...
How can we get consistently accurate measures?
Be consistent!
Why bother?

- Greater consistency leads to better data
- Better data leads to more confidence in management decisions
Regulatory Context Hierarchy

- Statutory
- Regulatory
- Policy
- Guidance
- Project-Specific
Hydrogeological Studies

Adequacy of a monitoring program hinges on quality and quantity of data.

- Determine subsurface geology and hydrology
  - Aquifers and geological layers constraining groundwater pathways
- Determine groundwater elevations throughout a site
- Develop a map of groundwater flow
- Obtain background data for monitoring program
- Initial evaluation and continuous assessment
Hydrogeological Studies - Data Collection

• Identify and characterize the uppermost aquifer and potential contaminant pathways

• Support the placement of monitoring wells capable of determining the facility’s effect on groundwater

• Data collection techniques should be appropriate to collect and interpret the data

• Site-specific - More complex subsurface geology requires more hydrogeological data
Hydrogeological Studies - Techniques

• Minimum techniques
  • Survey of existing geological information
  • Soil borings/rock corings
  • Material tests (densities, soil strength)
  • Water level measurements
  • Slug tests/pump tests

• Additional & indirect techniques
  • Geophysical well logs
  • Surface geophysical surveys
  • Aerial photography
  • Lithologic/structural mapping of outcrops
  • Tracer studies – dyes, salts, stable isotopes
  • Sieve analyses

Dye Tracer Study
Hydrogeological Studies - Output Options

- Boring log
- Groundwater modeling contour map
- Geologic cross-section
- Soil map
Technical Considerations

• Sampling methods

• Analytical

• Quality Assurance/Quality Control (QA/QC)
Analytical

- ADEC approved lab or alternative certification (i.e. NELAP) as approved by ADEC Solid Waste

- SW 846 methods for Appendix I &II constituents (SW8260, SW6020, etc)

- Alaska-specific methods for petroleum
  - Gasoline Range Organics- GRO by AK101
  - Diesel Range Organics – DRO by AK 102
  - Residual Range Organics – RRO by AK 103

- Data usability
Quality Assurance/Quality Control (QA/QC)

- **Field**
  - Trip blanks, equipment blanks
  - Field duplicate
  - Matrix Spike/Matrix Spike Duplicate (MS/MSD)

- **Lab**
  - Method blank
  - Laboratory Control Spike/Spike Duplicate (LCS/LCSD)
  - Continuing Calibration Verification (CCV)
  - Calibration
  - Tune
  - Internal Standards (IS)

- Data reduction (NDs, Duplicates, ...)

- Data evaluation criteria
Management Decision

A good decision is only as good as the information that was used in making the decision.
Field Sampling Equipment for Consistency

Water level measurements
- Before sampling
- During sampling
- Long-term level measurements

Water sampling - Methods
- Many techniques / Equipment types
- Low-flow minimal drawdown (most highly recommended)
  - Dedicated equipment
  - No dedicated equipment

Water monitoring
- Stabilizing parameters
- Instrument calibration
Field Sampling Equipment for Consistency

Water level measurements

• Water level meters
• Product Interface meter
• Pressure transducers
Sub-surface Water Collection Methods

• Bailers
• Peristaltic pumps
• Inertia pumps
• Submersible pumps
• Bladder pumps
Sub-surface Water Collection Equipment

• Bailers

• Peristaltic Pumps (max DTW ~28’)

**These methods are usually not used for “long-term sampling” and, in general, becoming less frequently used as are only appropriate in certain situations. These methods typically require special approval by the regulatory agency**
Sub-surface Water Collection Equipment

• Inertia pumps & Foot valves (Max DTW ~300')

• Submersible pumps (Portable & Dedicated) (max DTW ~200')
Sub-surface Water Collection Equipment

Bladder Pumps
( Portable or Dedicated)

• Air source
• Controller
• Pump (max DTW ~1000’)

Combination - Air source and controller
Sub-surface Water Collection Equipment

Bladder Pump

1. 12 V Compressor
2. ...
Water Quality Monitoring

Stabilizing Parameters – For Consistency

• Temperature
• pH
• Conductivity
• DO
• ORP
• Turbidity

• Proper Calibration
Water Quality Monitoring

Pen style
(3-parameter)

Multi-Parameter
meter

Turbidity

Down-hole
deployable
multi-parameter
meter

Flow through
cell
Field Sampling Equipment for Consistency

Water level measurements
  • Before sampling
  • During sampling
  • Long-term (optional)

Water sampling
  • Choose proper equipment to achieve requirements per SAP
  • Be consistent in following procedures for the approved method of sampling

Water monitoring
  • Stabilize parameters
  • Consistent and correct instrument calibration
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