

**Template for preparation of
ENVIRONMENTAL MONITORING PLANS
at
CLOSED MUNICIPAL LANDFILLS**

Prepared by the Maine Department of Environmental Protection, June 2016

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ENVIRONMENTAL MONITORING PLAN
***YourTown* LANDFILL**

Revised: [date]

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1. Introduction

This Environmental Monitoring Plan (EMP) sets forth the steps that will be taken to monitor water quality at the closed landfill on [specify street or road] in [Yourtown], Maine. It updates and supersedes the EMP version dated _____.

2. Monitoring locations

[NOTE: The DEP recognizes that monitoring networks will vary depending on site characteristics and that most EMPs will not include all of the types of monitoring locations listed below. List only those that apply at your landfill.]

Water quality is monitored at the locations shown on Figure 1. They include:

- [number] landfill monitoring wells;
- [number] residential water supply wells;
- [number] surface water locations; and
- [number] pore water locations.

Samples are collected at each location in accordance with the sampling and analytical work plan in section 3.

[NOTE: include the following paragraph or similar only if the monitoring network at your landfill includes inactive wells. An inactive monitoring well is one that is not currently sampled as part of the monitoring program but is being maintained for possible reactivation in the future.]

The monitoring network also includes [number] wells as shown on Figure 1. These wells are not currently sampled, but are maintained in accordance with DEP Standard Operating Procedure RWM-DR-028 in anticipation of future use.

3. Sampling and analytical work plan

A. Sampling frequency and parameters

Sampling locations are shown on Figure 1 and listed in Table 1. Samples are collected at each location [specify frequency, e.g., “once annually”, “in the spring and fall each year”] and tested for the field and laboratory parameters listed in Table 2.

[NOTE: waste disposal history of the landfill, proximity of sensitive receptors, geology and other site characteristics should be considered in determining sampling frequency and analytical parameters. The parameter list in Table 2 of this template is a starting point for development of a site specific list in consultation with the DEP.]

B. Sample collection and handling

Samples will be collected in accordance with the standard operating procedures (SOPs) in Appendix C and for parameters analyzed in the laboratory will include one field duplicate per every twenty sample events (5%). Any deviations from the SOPs will be noted by field

personnel and documented in the annual Water Quality Monitoring Report to be submitted to the DEP as provided in section 6 of this EMP.

[NOTE: SOPs developed by the DEP or US Environmental Protection Agency (EPA) must be followed where applicable. The relevant DEP and EPA SOPs can be downloaded from DEP website. For the purpose of Appendix C, reference to the procedure name or document number is sufficient where a DEP or EPA SOP will be followed.]

Alternative or “nonstandard” procedures may be used only if approved in advance by the DEP. For example, the preferred methodology for collection of groundwater samples from monitoring wells is the “low flow” procedure specified in DEP SOP # DR003 (March 27, 2009) or the equivalent EPA procedure; collection of monitoring well samples using a different procedure requires prior approval. If an alternative procedure is followed, reference to that procedure by name and document number with the date of its approval by DEP is sufficient.]

Continuous chain of custody of all samples will be maintained as specified in [procedure name or document number] from the point of collection until the sample is delivered to the contracting laboratory for analysis. Sample container requirements, preservation methods and maximum holding times for each parameter are as follows:

[NOTE: identification of container requirements, preservation methods and holding times is required under chapter 405, section 2, of department rules.]

C. Lab analysis and reporting

All samples will be analyzed by an environmental laboratory certified or accredited under the rules of the Maine Department of Health and Human Services, 10-144 CMR 263 (effective April 1, 2010). The laboratory will be required to provide a narrative report that includes:

- Date and time each analysis was completed (to verify holding times);
- Title of the analysis method used with reference;
- The percent recoveries of matrix spikes as specified in the analytical methodology;
- Corrections made for interferences, if any;
- Sample pre-treatments, if any; and
- The data required to support a Tier 2 data validation as specified by the Region 1 office of the U.S. Environmental Protection Agency.

[NOTE: In EPA guidance, the data needed to support Tier 2 validation is referred to as a “Level 3 data package.”]

The laboratory report also will specify the detection limits of each procedure and the practical quantitation limits for each parameter. The analysts performing the work and the laboratory technical director will be required to certify the results.

4. Data validation

Upon receipt of the laboratory report, the results will be validated to ensure the data is reliable. The first step will be to determine if the data is complete and whether holding times and quality assurance requirements were met. The data will be deemed complete if: 1) all analyses for a particular sample have been completed and the results reported in writing by those involved in the analyses; and 2) all required sample documentation has been provided. Required documentation for non-field parameters includes chain of custody records, verification of sample holding times and the following control data:

- Surrogate recoveries in percent;
- Method blank results;
- Laboratory control spike results in percent; and
- Matrix spike / matrix spike duplicate results in percent.

The second step of validation will be to calculate and tabulate the ratio between total dissolved solids (TDS) and specific conductance for each sample location and identify all sample locations for which this ratio falls outside the range of 0.55 to 0.75. The relative percent difference (RPD) for all duplicate samples also will be calculated and tabulated if the sample and the duplicate values are greater than 5 times the detection limit for the parameter tested. All parameters for which the RPD exceeds 10% will be identified. Additionally, parameters present in equipment blanks, trip blanks and changes in well depths will be identified.

The results of the data validation will be included in the Water Quality Monitoring Report to be submitted to the DEP.

5. Reporting of electronic data

Within 45 days after sample collection, the water quality data will be submitted to the DEP in electronic format using the DEP required template—EDD version 6.0. The template will be completed in accordance with the guidance posted on the DEP website (www.maine.gov/dep/maps-data/egad/).

The electronic submittal will be directed to EGAD manager for the DEP Bureau of Remediation and Waste Management (DEP.EDD@maine.gov), copy to the manager of the DEP Landfill Closure and Remediation Program (*currently matthew.r.young@maine.gov*).

6. Water quality monitoring report

A written report will be submitted to the DEP by the end of each year in which sampling was performed. The report will include:

A. A discussion of the water quality sampling results including:

- Date of submission of the data in EDD format;
- Exceedances, if any, of the Maximum Contaminant Levels (MCLs) and Maximum Exposure Guidelines (MEGs) for drinking water as established by the Maine Center for Disease Control;

- A comparison of reported parameter values versus historical values using appropriate analyses to identify potentially statistically significant trends. In many instances, contaminant trends may be identified visually by viewing time series graphs for contaminants of concern. The identification of statistically significant trends using statistical methods may also be necessary;
 - A summary of parameters detected in equipment blanks and trip blanks;
 - A summary of the results of data validation under Section 4.
- B. A discussion of the gas monitoring data results including:
- Date of submission of the data in EDD format;
- C. A map (Figure 1) of the facility showing:
- The property boundary and solid waste boundary;
 - The location of each sampling point with identification number; and
 - Elevation datum.
- D. Copies of the signed field data sheets, each containing:
- Temperature and weather conditions;
 - Well depth and reference point;
 - Water elevation in each well before purging;
 - Purge volumes, pumping rates and purge stabilization data for each well;
 - Estimated flow at surface water sampling points;
 - Field data measurements (pH, conductivity, dissolved oxygen, temperature and turbidity);
 - Observations on well security and condition, including identification of well depths that have changed since construction; and
 - Observations on conditions during purging or sampling (e.g., odor, sheens).
- E. A table summarizing the current year's analytical results.
- F. Chain of custody records.
- G. The laboratory report.
- H. Observed land use changes, if any, within 1000 feet of the landfill solid waste boundary.
- I. Requested changes, if any, to the EMP and the basis for the requested change.

The Department anticipates transitioning its filing system from a paper based to an electronic based system within the next few years. As the paper formatted file is still considered the official

project record, a paper copy is required for all documents submitted to the Department. However, to assist with the transition, the Department is requesting that documents submitted be in both paper and electronic (PDF) format. If your submittals have size issues hindering transmission, please contact your project manager within the Department to assist with the transfer of electronic documents.

FIGURE 1: site plan with sampling locations

TABLE 1: Water Quality Sampling Locations
Yourtown Municipal Landfill

Location ID	Type
MW-1	monitoring well
MW-2	monitoring well
MW-3	monitoring well
MW-4	monitoring well
MW-5	monitoring well
SW-1	surface water - stream
SW-2	surface water - stream
PW-101	Pore-water
PW-102	Pore-water
RW-1	residential well – drilled
RW-2	residential well – drilled
RW-3	residential well – dug

**TABLE 2: Detection Parameters for Water Quality Analysis
Yourtown Municipal Landfill**

[This list is a starting point for development of a site specific parameter list]

Laboratory parameter	Recommended Method	Reporting Limit (mg/L)
Ammonia-N	SM4500NH3D	0.1
Arsenic	SW6010C	0.005
Calcium	SW6010C	0.05
Chloride	SW9056A	2.0
Iron	SW6010C	0.1
Magnesium	SW6010C	0.05
Manganese	SW6010C	0.005
Nitrate-N + Nitrite-N	SW9056A	0.05
Potassium	SW6010C	1.0
Sodium	SW6010C	1.0
Sulfate	SW9056A	1.0
Total Alkalinity	SM2320B	5.0
Total Dissolved Solids	SM2540C	10.0
Total Organic Carbon	SW9060A	1.0
Field parameters		
Dissolved oxygen	field measurement	0.1
pH	field measurement	1(SU)
Specific conductivity	field measurement	1 (µS/cm)
Temperature	field measurement	0.1(Degree C)
Turbidity	field measurement	0.01(NTU)
Water depth/elevation	field measurement	0.01 (ft.)

APPENDIX A: well boring logs

[NOTE: Well logs should contain the following information in the same or similar format]

APPENDIX B: Standard Operation Procedures (SOPs)

SOP ID #	SOP Title
RWM-DR-001	Water Sample Collection from Water Supply Wells
RWM-DR-003	Groundwater Sampling Using Low Flow Purging and Sampling for Long-term Monitoring
RWM-DR-023	Protocol for Groundwater/Surface Water Interface Sampling Using a Pore Water Sampler
RWM-DR-028	Maintaining Inactive Monitoring Wells

SOPs listed above may be found here:

<http://www.maine.gov/dep/spills/publications/sops/index.html>