

Ground Water Monitoring System Plan Requirements

20.9.9 NMAC SOLID WASTE RULES

The following information **must** be included in the ground water monitoring system plan, as required by the Solid Waste Rules:

- Detailed information on the number of wells, well locations, well depths, well construction, and purpose of each well
- Maps showing all monitoring well and piezometer (if applicable) locations
- Construction and lithologic log for each monitoring well or piezometer
- Monitoring wells survey information
- Detailed description of the hydrogeologic characteristics of the site, a geologic cross-section of the site
- Detailed description of landfill's ground water monitoring program
- Detailed descriptions of sampling and analysis procedures
- Proposed sampling frequencies
- Test methodologies
- Procedures for sample collection
- Procedures for sample preservation and shipment
- Procedures for chain of custody control
- Procedures for quality assurance and quality control
- Procedures used to establish background concentrations of all constituents and parameters listed in 20.9.9.20 NMAC
- Site specific assessment monitoring levels (AMLs) for each constituent listed in 20.9.9.20 NMAC Subsections A and C (approved by Bureau)
- Practical quantitation limits (PQL) for each constituent listed in 20.9.9.20 NMAC
- Procedure to measure ground water elevations to the hundredth of a foot
- Procedure to determine the rate and direction of ground water flow each time ground water is sampled
- Statistical procedures to determined exceedances of constituents listed in 20.9.9.20 NMAC
- Procedures to be followed if site specific AMLs are exceeded
- Procedures to be followed if CALs are exceeded
- Time frame for submission of semi-annual and/or annual ground water monitoring reports
- Outline of what the detection monitoring reports contain (refer to Guidance Document for Ground Water Monitoring Report)
- Bureau approved alternate parameter list (if applicable)
- Procedure for installation of additional monitoring wells or piezometers
- Maintenance procedures for measurement, sampling, and analytical devices used in ground water monitoring

Ground Water Monitoring System Plan Recommended Format

Table of Contents

- Section list with page numbers
- List of Tables with page numbers
- List of Attachments/Appendices with page numbers

1) Purpose

This section would include: a statement indicating why this plan is needed and what Solid Waste Rules will be addressed.

2) Summary of Geohydrology

This section would include: regional and landfill geology; landfill hydrogeology; depth to ground water; potential effects on ground water due to surrounding activities and what this means to ground water under the landfill site. Include references on where the geological information was obtained and copies of these in the attachment/appendices section of the plan.

3) Summary of Ground Water Monitoring System

This section would include: range of depth to ground water at the site; whether or not there is a decline in depth to ground water below the site and potential causes of the decline; historical and current ground water gradient below the site; whether or not the ground water gradient has changed below the site and potential causes of the change(s); type and approximate distance of wells (municipal, irrigation, domestic) located near the landfill; number of monitoring and/or piezometric wells at the landfill site; reasoning behind number, spacing, and depth of monitoring and/or piezometric wells at the landfill site; when the monitoring and/or piezometric wells were installed; whether or not any wells have been abandoned and if they were, which ones, when, why, and by which method; table showing the summary of monitoring well construction details, for example:

Well I.D.	Well Completion Date	Coordinates	Top of Casing Elevation (ft amsl)	Total Depth of Boring (ft bgs)	Bottom of Screen (ft bgs)	Top of Screen (ft bgs)	Ground Elevation (ft amsl)
MW - #		N = # E = #					

4) Summary of Background Monitoring

This section would include: how many samples were used to as the baseline for determination of assessment monitoring levels (AMLs); how will concentrations above ground water protection standards be dealt with; whether or not constituents naturally occur at concentrations above prescriptive AMLs, which constituents (if any) were found above prescriptive AMLs during baseline sampling; which wells (if any) were constituents

found above prescriptive AMLs during baseline sampling; and at what concentrations were constituents found at during background sampling. This can be reported narratively or in table form as follows:

Well I.D	Date of Baseline Approved	Prescriptive AML	Aluminum	Boron	Chloride	etc. →
MW-#						

This section would also include a narrative on historical land use of the site and the possible impacts that use might have on the ground water quality at that site; what type of statistical methods will be used in the determination of potential exceedances at the site; and will the statistical methods be used on intrawell or interwell comparisons.

5) Ground Water Sampling and Analysis

This section would include: sampling frequency, sampling procedures, techniques for sample collection, preservation, shipment, analytical testing, chain-of-custody, and quality assurance/quality control descriptions. Include the list of Alternate Parameters (if any), and a table of analytical parameters from 20.9.9.20 NMAC Subsections A and C. This section would also include: a discussion of when, how, and with what the ground water elevations will be measured and the accuracy to which they will be measured as well as a statement acknowledging the need to measure ground water elevations so that the measurements are not affected by temporal changes; how ground water gradient and flow direction will be calculated; whether or not the 5 (or 8, depending on statistical methods to be used) rounds of sampling events to establish background ground water have occurred and if they have not, when will that occur for each of the onsite wells; which statistical method and/or program will be used in order to establish site specific AMLs or UTLVs; the method used to determine exceedances; and a statement acknowledging that the following list of items will be reported to the Bureau for each ground water monitoring event for all samples include the following:

- Chemical parameter
- Test Method (EPA or equivalent)
- Ground water protection standard (GWPS)
- Method detection limit (MDL)
- Practical quantitation limit (PQL)
- Well number
- Laboratory ID sample number
- Chain-of-custody documentation
- Date of sampling
- Date sample received at the laboratory
- Date analysis commenced

- Results, showing on the same sheet, the parameter, CAS number, concentration (with units), GWPS, PQL, qualifier code (I.E. J,B,U, etc.), well number, and date of sampling
- Method of sample preservation
- Review (signature and date)
- Results of analysis of field and trip blanks
- QA/QC summary report (laboratory blanks, spike, etc.)
- Report of anomalies (e.g., non-conformance, with QA/QC, corrective actions, etc.)

6) Detection Monitoring Program

This section would include: whether the landfill will perform semi-annual or annual monitoring, what wells will be used for ground water monitoring, what types of graphs will be created and provided in each report; what parameters will be tested at each sampling event; acknowledgement that the full list of parameters in 20.9.9.20 NMAC Subsections A and C will be sampled and reported to the Bureau at least once every five years; and narrative on the procedures to be followed if a parameter exceeds either Site Specific AMLs or CALs.

7) Monitoring Methodology

This section would include: what methodology requirements will be followed.

a) Sample Collection

This section would include: narrative of where the procedures for sampling come from (e.g., EPA guidelines, etc.)

i) Wellhead Preparation

This section would include: what types of activities take place prior to sample collection including observation of wellhead integrity, cleanliness, signs of possible contamination, any obvious odors to be noted on field data sheets, condition of cap, and what procedures will be followed if a damaged well is encountered.

ii) Ground Water Elevation Measurements

This section would include: when static water level is to be measured, where ground water elevation will be measured to insure a consistent datum, how precise will the ground water elevation be measured (requirement: ground water elevations shall be measured within one – hundredths of a foot) will date and time be reported along with the elevations, what the ground water elevations will be used for, and how will the water level measuring device be decontaminated.

iii) Well Purging

This section would include: statement on the purpose of well purging, what method of purging will be used and why it was chosen, when field parameter

data will be collected and where it will be recorded, and how will the purged water be disposed of.

iv) Ground Water Sample Collection

This section would include: where will sample containers be obtained, where will the preservatives for stabilization of samples come from, what type of pump or sampling will be used, contingency plan if the pump fails, what type of precaution will be taken in order to sample VOCs correctly, what method will be used to determine sequence of well sampling, the correct procedure for sampling VOCs and organics, and where the pertinent data will be recorded.

NOTE: metals should be sampled for both total and dissolved (filtered and unfiltered) if water is turbid (turbidity is > 5) or ground water from monitoring wells shows history of elevated or increasing trend in metal concentrations

b) Sample Handling and Custody Requirements

This section would include: how will the samples be handled after collection, what will the samples be transported in, how will the samples be packaged for shipment to the laboratory, what type of tracking will be employed, what type of labeling will be used on the sample containers, and statement about the use of chain of custody forms.

c) Quality Control Requirements

This section would include: description, reasoning, quantity (s) for the use of:

- trip blanks
- field blanks
- field blank duplicates
- matrix spikes
- matrix spike duplicates

This section will also include a narrative on cation-anion balancing (if applicable)

d) Instrument/Equipment Testing, Inspection, and Maintenance Requirements

This section would include: what type of field equipment needs to be decontaminated, will the field equipment be decontaminated onsite and/or at the office, procedures for field decontamination, and method of disposal of material generated from the decontamination process.

e) Instrument Calibration and Frequency

This section would include: manufacturers calibration schedule, maintenance schedule, field calibration procedures, where will the documentation be kept with procedures and calibration verification.

8) Data Evaluation

a) QA/QC Check

This section would include: what the laboratory analytical report is to contain, what items will be checked by the landfill owner/operator on the laboratory analytical reports, historical data comparison, procedures to determine data anomalies, procedures used to evaluate the data anomalies received from the laboratory, procedures used to correct data anomalies, type of statistical analysis to be used to determine potential anomalies.

b) Water Quality Assessment

This section would include: procedures for the determination of significant change of data, procedures to determine potential organic and inorganic exceedances, procedures to be followed if organic and inorganic exceedances are found above AMLs and/or CALs, type of statistical analysis that will be used to evaluate ground water quality, and information on whether the facility is using interwell or intrawell comparison and justification for that choice.

c) Alternate Source Demonstration

This section would include: procedure for determining a potential source of contamination source from an off-site source, natural variability of the ground water zone (s), or an error in the sampling and analysis process; procedure to seek alternate source approval; procedure to be followed if approval of alternate source is not granted by the Bureau.

9) Reporting Summary

This section would include: description of documentation to be submitted to the Bureau after each sampling event (either annual or semi-annual).

References

This section would include: references for all the contents of the ground water monitoring system plan.

Attachments/Appendices

- Appropriate pages from a USGS Water Resource Investigation Report or other source of information that appropriately describes the geologic and hydrologic conditions below the landfill site.
- Tables of ground water elevation data such as:

Well I.D.	Top of Casing Elevation (ft msl)	Date Measured	Depth to Water (ft below TOC)	Ground Water Elevation (ft msl)
MW-#				

- Graph depicting historical ground water elevation.
- Site location map.

- Potentiometric map(s). If the ground water direction has changed direction at the site, then provide as many potentiometric surface maps as needed to show the variations.
- Monitoring well location map
- All monitoring well logs.
- All monitoring well construction logs.
- All monitoring well lithologic logs.
- Form certified by a qualified ground water scientist that the ground water monitoring system plan is in compliance with the Rules (form provided by the Bureau).
- Ground water quality data time plots.
- Table of baseline concentrations.
- Statistical calculations for site specific AMLs.
- Calculations for data normality/outliers.
- Field data form.
- Copies of any approval letters received from the Bureau regarding the landfill such as background ground water quality, sampling frequency, etc..