

NMED SWB Ground Water Monitoring System Plan/Ground Water Monitoring Plan Requirements

20.9.9 NMAC SOLID WASTE RULES

This guidance document summarizes the content of Ground Water Monitoring System Plans and Ground Water Monitoring Plans as required by the Solid Waste Rules. The following outline identifies the specific requirements of the plans and the associated citations within the Solid Waste Rules. Although discussed as separate plans in the Solid Waste Rules, Ground Water Monitoring System Plans and Ground Water Monitoring Plans are typically combined into single documents.

The following information **must** be included in the *Ground Water Monitoring System Plan*, as required by the Solid Waste Rules:

- Detailed plan for all wells, piezometers or other measurement and sampling devices (20.9.9.9.B NMAC):
 - Procedures for installation and decommissioning of monitoring wells, piezometers, or other ground water measurement, sampling, or analytical devices, including submittal of a written notice of intent regarding installation or decommissioning of monitoring wells or piezometers (20.9.9.9.E NMAC).
 - Description of well construction details for proposed monitoring wells in accordance with ASTM Method D-5092 or Solid Waste Rule requirements (20.9.9.9.J NMAC).
 - Construction and lithologic log for each existing monitoring well or piezometer (20.9.9.9.F(2) NMAC).
 - Certification by a qualified ground water scientist that the existing monitoring device has been installed in compliance with 20.9.9 NMAC (20.9.9.9.F(1) NMAC).
 - Monitoring well survey information (existing wells) or procedures (proposed wells) (20.9.9.9.K NMAC).
 - Operation and maintenance procedures for monitoring wells, piezometers, and other measurement, sampling, and analytical devices (20.9.9.9.L NMAC)
 - If required by the Secretary, information on vadose zone or leak detection systems, including types of techniques/devices in use or to be used; frequency of testing and number/location of sampling points; and an action plan to address potential vadose zone contamination and sources of contamination (20.9.9.9.N NMAC).
- Explanation of the purpose and placement of each well, piezometer, or other measurement or sampling device (20.9.9.9.B NMAC):
 - Description of the existing or proposed locations of monitoring wells to represent background (unaffected) ground water quality and the quality of ground water passing the detection monitoring point (waste management unit boundaries) (20.9.9.9.A NMAC).
 - Maps showing the locations existing and proposed wells, piezometers, and other measurement or sampling devices (20.9.9.9.B NMAC).

- Description and justification of the number, spacing, and depths of monitoring devices based on site-specific technical information (20.9.9.9.M NMAC).
- If appropriate, proposal for an alternate detection monitoring point(s) (20.9.9.9.H NMAC).
- If appropriate, proposal for a multi-unit ground water monitoring system (20.9.9.9.I NMAC).
- Certification by a qualified ground water scientist on a form provided by the Department that the Ground Water Monitoring System Plan complies with 20.9.9.9 NMAC.

The following information **must** be included in the *Ground Water Monitoring Plan*, as required by the Solid Waste Rules:

- Description of the hydrogeologic characteristics of the site (20.9.9.9.C NMAC).
- Geologic cross-section of the site (20.9.9.9.C NMAC).
- Detailed description of all aspects of the ground water monitoring program (20.9.9.10.A NMAC):
 - Description of ground water sampling and analysis procedures (20.9.9.9.C NMAC; 20.9.9.10.A NMAC; 20.9.9.10.B NMAC), including procedures and techniques for sample collection, sample preservation and shipment, analytical procedures, chain of custody control, and quality assurance/quality control (20.9.9.10.B NMAC).
 - Sampling and analytical testing methodologies (20.9.9.10.A NMAC; 20.9.9.10.C NMAC).
 - Practical quantitation limits (PQL) for each constituent listed in 20.9.9.20 NMAC (20.9.9.10.A NMAC; 20.9.9.10.C NMAC).
 - Ground water depth measurements, ground water elevation calculations, and determination of rate and direction of ground water flow (20.9.9.10.D NMAC).
 - Procedures to be used to establish background concentrations of all constituents and parameters listed in 20.9.9.20 NMAC (20.9.9.10.A NMAC; 20.9.9.10.E through H NMAC).
 - Procedures for identification of ground water protection standards and determination of assessment monitoring levels (AML) for constituents listed or referenced in Subsection A of 20.9.9.20 NMAC and the parameter of pH (20.9.9.10.A NMAC; 20.9.9.10.I NMAC; 20.9.9.12 NMAC).
 - Procedures for comparison of constituent concentrations and parameter values with background concentrations/parameter values and ground water protection standards (20.9.9.10.F NMAC; 20.9.9.10.K NMAC; 20.9.9.10.L NMAC).
- Detection monitoring plan (20.9.9.9.C NMAC):
 - Sampling frequencies (20.9.9.10.A NMAC; 20.9.9.10.M NMAC; 20.9.9.11.A NMAC).
 - Ground water constituents and parameters to be tested for (i.e., Subsections A and C of 20.9.9.20 NMAC) under the detection monitoring program (20.9.9.10.M(2) NMAC).
 - Procedures for requesting approval of an amended ground water detection monitoring program (20.9.9.11.A NMAC); description of minimum testing frequency in the event of amended detection monitoring program approval (20.9.9.11.B NMAC).

- Description of actions to be taken in the event that an AML for a constituent or parameter referenced in Subsection A of 20.9.9.20 NMAC or approved alternate constituent list is exceeded (20.9.9.10.M(2) NMAC; 20.9.9.11.C NMAC).
- Description of procedures for reporting of ground water documentation to the Department, including content of submitted documentation (20.9.9.10.N NMAC).
- Certification by a qualified ground water scientist on a form provided by the Department that the Ground Water Monitoring Plan complies with 20.9.9.9 NMAC (20.9.9.9.C NMAC).

Ground Water Monitoring System Plan/Ground Water Monitoring Plan: Suggested Document Format

Ground Water Monitoring System Plans and Ground Water Monitoring Plans may be submitted as separate documents or as combined documents. The suggested format provided in this guidance documents addresses a combined document format. Regardless of the document format chosen for development of the plans, the suggested format provides additional guidance on the type of information typically sought by the SWB to ensure that the requirements of the Solid Waste Rules are met.

Table of Contents

- Section list 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) Geology and Hydrogeology

This section would include: regional and landfill geology and hydrogeology; discussion of geologic cross-section of the site; 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) 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; description of the existing and proposed monitoring wells and piezometers at the landfill site, including a discussion of intended purpose (i.e., upgradient water quality vs. downgradient/detection monitoring point water quality) and a map showing the locations of these monitoring devices; reasoning behind number, spacing, and depth of monitoring wells and piezometers at the landfill site; when the monitoring wells and/or piezometers were installed; information on any wells have been abandoned, including names, date of abandonment, reasons for abandonment, and abandonment methods; procedures describing the installation and construction of proposed monitoring wells and piezometers; procedures describing proposed decommissioning of monitoring wells and piezometers; monitoring well survey information for existing monitoring wells/piezometers and survey procedures for proposed monitoring wells/piezometers; operation and maintenance procedures for monitoring wells and piezometers; if required by the Secretary, information on vadose zone or leak detection systems, including types of

techniques/devices in use or to be used, frequency of testing and number/location of sampling points, and an action plan to address potential vadose zone contamination and sources of contamination; if appropriate, a description of proposed alternate detection monitoring points and rationale/documentation supporting the proposal; and if appropriate, a description of a proposed multi-unit ground water monitoring system and rationale/documentation supporting the proposal.

4) Background Monitoring and Assessment Monitoring Levels

This section would include: description of procedures used or to be used to establish background concentrations (including how many samples were used or will be used to establish background concentrations); description of procedures used or to be used to identify ground water protection standards and establish assessment monitoring levels (AMLs); if background concentrations have previously been approved, presentation of the approved background values; if AMLs have previously been approved, presentation of the approved AMLs and discussion as to whether or not constituents occur at concentrations above prescriptive AMLs and which constituents (if any) and wells were found above prescriptive AMLs during background sampling.

If background concentrations have been established and exceed AMLs, include a discussion of the possible cause (e.g., naturally occurring or anthropogenic) and provide supporting information (e.g., narrative on historical land use of the site and the possible impacts that use might have on the ground water quality at that site).

5) Comparison of Constituent Concentrations/Parameter Values with Background Concentrations/Parameter Values and Other Values

This section would include: discussion of procedures for comparison of constituent concentrations/parameter values with background concentrations/parameter values and other values (e.g., AMLs, ground water protection standards); whether an individual well comparison procedure (“intrawell” comparison”) will be used or a procedure comparing well concentrations with background levels established from hydraulically upgradient wells (“interwell” comparison) will be used; description of the statistical method(s) to be used for comparison purposes.

6) Ground Water Sampling and Analysis

This section would include the following information:

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 Depth Measurements

This section would include: protocols to be followed such that measurements are not affected by temporal changes; when static water level is to be measured; location from which ground water depth will be measured to ensure a consistent datum; accuracy of ground water depth measurements (requirement: measured within one – hundredth of a foot); date and time of measurements; how will the water level measuring device be decontaminated.

iii) Ground Water Gradient and Flow Direction

This section would include: description of the calculation of ground water elevations at each monitoring well or piezometer; description of the calculation of ground water hydraulic gradient; discussion of ground water flow direction determination.

iv) Well Purging

This section would include: statement on the purpose of well purging; discussion of the method of purging will be used and why it was chosen; discussion regarding collection and recording of field parameter data; discussion of purge water disposal.

v) Ground Water Sample Collection

This section would include: statement regarding where sample containers and preservatives will be obtained; discussion of device (e.g., bailers, specific type of pump) to be used for sample collection; contingency plan in the event of sampling device failure; procedures for collection of ground water samples for various parameters (VOCs, SVOCs, inorganics, metals); precautions to be taken in order to sample VOCs correctly; methods to be used to determine sequence of well sampling, discussion regarding recording of pertinent data.

NOTE: Ground water samples collected for metals analysis are not to be field-filtered prior to laboratory analysis in accordance with 20.9.9.10.C NMAC.

However, in addition to the collection of unfiltered samples, owners or operators may also wish to collect filtered samples if field measurements indicate turbidity greater than 5 NTUs to evaluate the possible effect of turbidity on measured metals concentrations.

b) Sample Handling and Custody Requirements

This section would include: description of how samples will be handled after collection, including sample packaging, preservation, transportation, and tracking; type of labeling to be used on the sample containers; discussion regarding the use of chain of custody forms.

c) Analytical Testing Methodologies

This section would include: identification and description of the laboratory sample preparation and analytical methods to be used for the analysis of ground water samples; identification of practical quantitation limits (PQL) anticipated to be achieved by the analytical methodologies to be used.

d) Quality Control Requirements

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

- trip blanks
- field blanks
- equipment rinsate blanks
- sample duplicates
- matrix spikes
- matrix spike duplicates

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

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

This section would include: discussion of the equipment and instruments used for ground water monitoring; description of equipment/instrument decontamination procedures, including location (field, office) where decontamination occurs; discussion of disposal method of material generated from the decontamination process.

f) Instrument Calibration and Frequency

This section would include: manufacturer's calibration and maintenance schedule; field calibration procedures; location of documentation pertaining to calibration procedures and calibration records.

7) Data Evaluation

a) QA/QC Check

This section would include: description of QA/QC procedures to be contained in laboratory analytical report; identification of specific QA/QC items to 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: discussion of the procedures to be used to determine significant changes in data; discussion of procedures to be used to determine if background concentrations, AMLs, or ground water protection standards are exceeded; brief description of actions to be taken if AMLs are exceeded (i.e., notification of AML exceedance and submittal of assessment monitoring plan are required; submittal of alternate source demonstration is optional); brief description of actions to be taken if ground water quality standards are exceeded.

8) Detection Monitoring Program

This section would include: discussion of detection monitoring frequency (whether semi-annual sampling per 20.9.9.11.A NMAC or annual sampling of an approved alternate constituent list per 20.9.9.11.A(3) NMAC); identification of the monitoring wells to be

used for detection monitoring; identification of the constituents/parameters to be tested at each sampling event (either the constituents referenced by Subsections A and C of 20.9.9.20 NMAC or an alternate constituent list approved pursuant to 20.9.9.11.A NMAC); description of procedures for requesting approval of an amended ground water detection monitoring program (i.e., alternate constituent list) pursuant to 20.9.9.11.A NMAC; acknowledgement that the full list of parameters in Subsection A of 20.9.9.20 NMAC will be sampled and reported to the Bureau at least once every five years regardless of Department approval of an alternate constituent list under 20.9.9.11.A NMAC; discussion of specific tables and graphs to be created to present ground water analytical data; and a detailed narrative on the procedures to be followed if an AML is exceeded (see 20.9.9.11.C NMAC and 20.9.9.13 NMAC for details).

9) Reporting Summary

This section would include: description of documentation to be submitted to the SWB within 90 days of completion of sampling (refer to Paragraphs (1) through (20) of Subsection N of 20.9.9.10 NMAC for required documentation).

References

This section would include: references for all the contents of the Ground Water Monitoring System Plan and Ground Water Monitoring 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 in the vicinity of the landfill site.
- 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 = #					

- Table presenting approved background concentrations and AMLs, for example:

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

- Graphs depicting historical ground water elevation, if available for the site
- Site location map
- Potentiometric map(s), if available for the site (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
- Monitoring well construction logs for existing wells
- Monitoring well lithologic logs for existing wells
- Certification by a qualified ground water scientist that the Ground Water Monitoring System Plan and Ground Water Monitoring Plan are in compliance with 20.9.9 NMAC (form provided by the SWB).
- Field data form (example)
- Copies of any approval letters received from the SWB regarding the landfill such as background ground water quality, AMLs, sampling frequency, etc.