

PERMIT MODULE – XI
PHASE 2
GROUNDWATER MONITORING REQUIREMENTS
9 VAC 20-81-250

Phase 2 monitoring is designed to ensure the earliest possible recognition of a landfill impact to the uppermost aquifer at levels which may exceed groundwater protection standards (GPS) and trigger potential groundwater remediation.

A GROUNDWATER COMPLIANCE POINT

A.1 Uppermost Aquifer

The compliance point for groundwater monitoring is the uppermost aquifer [250.A.2.a] which encompasses the entire thickness between the first encounter with groundwater (not to include any perched water) and the first encounter with a confining unit forming the lower boundary of the uppermost aquifer [A.3.f.(1).(b/c)].

A.2 Monitoring Well Locations

All wells in the monitoring network, including those at the disposal unit boundary, or at an alternate compliance point [250.A.3.a.(3)], shall be installed within the permitted facility boundary and screened within the uppermost aquifer unless a variance [250.A.3.a.(2)] meeting the requirements of 740.B has been granted.

A.3 Location Restrictions

No monitoring well serving the function defined under 250.A.3.a can be:

A.3.a located at a distance more than 500 feet away from the disposal unit boundary or

A.3.b outside of the facility boundary [740.A].

B MONITORING NETWORK REQUIREMENTS

B.1 Mandatory Performance Standards to be met

B.1.a Network requirements of 250.A.2.a and A.3.a, b, f.

B.1.b Wells requiring replacement due to non-performance shall be reported to the Department within 30 days of recognizing the non-performance. The notification shall include a site plan depicting the proposed location for the replacement well(s) for Department review [530.C.1].

B.1.c Wells that require replacement must be replaced prior to the next regularly scheduled groundwater sampling event unless the Director has granted an extension to meeting the monitoring system compliance requirements under 250.A.3.a.

B.1.d Any wells that require abandonment shall be sealed and abandoned in accordance with existing EPA Resource Conservation and Recovery Act guidance as well as any applicable state or local requirements.

B.2 Installation, Operations and Maintenance

All wells shall be installed, operated and maintained during the life of the monitoring program in accordance with requirements of **250.A.3.e, c, d.**

B.3 Well Designations

The following wells shall be included in the groundwater monitoring network according to the phasing schedule below:

Cell Construction	Monitoring Well(s) added to Network	Well(s) abandoned
Cell 1	MW-1 and MW-2 (up-gradient wells); MW-3, MW-9, and MW-13	
Cell 2	MW-5	
Cell 3	MW-7 and MW-11	
Cell 4	MW-4 and MW-10	
Cell 5	MW-6	MW-11
Cell 6	MW-8	MW-2

Note: Groundwater Monitoring Wells shall be installed 180 days prior to waste being placed in the associated cell.

C AQUIFER INFORMATION

C.1 Aquifer Data Acquisition - Requirements

C.1.a Static groundwater elevations [**250.A.4.c**] shall be:

- C.1.a.(1)** measured in all monitoring wells.
- C.1.a.(2)** measured to an accuracy of 0.01 foot.
- C.1.a.(3)** measured each time groundwater is sampled on site.

C.1.b Groundwater flow rate and direction [**250.A.4.c**] shall be:

- C.1.b.(1)** determined each time groundwater is sampled on site,
- C.1.b.(2)** calculated using technical methods accepted for use in EPA RCRA groundwater programs.

C.2 Aquifer Data Acquisition - Response

C.2.a The Permittee shall evaluate the function of each of the wells included in the monitoring network each time groundwater is sampled. If the evaluation shows that one or more of the well(s) no longer functions in a manner that meets the requirements of **250.A.3.e**, the Permittee shall:

C.2.a.(1) Within 30 days of recognizing the non-performance, notify the Department of the need to modify the number, location, or depth of the monitoring wells, and provide for Department review, proposed locations for new (replacement) monitoring wells keyed to a site plan.

C.2.a.(2) Complete additions or modifications to the network, prior to the next regularly scheduled groundwater sampling event, unless an extension has been granted by the Director for meeting the monitoring system compliance requirements under **250.A.3.a**.

D SAMPLING ACTIONS

The Permittee shall:

D.1 Meet the field sampling and laboratory procedures of **250.A.4.a**.

D.2 Use the analytical methods of EPA SW-846 as amended [**250.A.4.b**].

D.3 Not filter of groundwater samples prior to analysis [**250.A.4.b**].

D.4 Sample all Phase 2 monitoring constituents in Table 3.1 column A as well as those detected constituents found in column B [**250.C.3.a, b**].

E SAMPLING FREQUENCY

E.1 The Permittee shall, during the active life and post-closure care periods, sample groundwater and analyze for the required Table 3.1 constituents in all monitoring wells on at least a semi-annual basis [**250.C.3.a.(2)**].

E.2 The length of the semi-annual sampling period shall meet the requirements of **9 VAC 20-81-10**.

E.3 The initial Phase 2 sampling event shall be completed in the timeframe required under **C.3.a.(1)**.

F DETERMINATION OF BACKGROUND & GPS

F.1 The Permittee shall establish site-specific Phase 2 background values [**250.A.4.d** –

f] for all detected constituents within the timeframes of **250.C.3.b.(1)**.

F.2 Groundwater Protection Standards (GPS), established using the process defined under **250.A.6.b**, for each detected Phase 2 monitoring constituent shall be:

F.2.a proposed within timelines of C.3.c.

F.3 Groundwater Protection Standards shall be updated as follows:

F.3.a For Federal Maximum Contaminant Level-based GPS or department approved background, following the process under **250.A.6.d**.

F.3.b For Alternate Concentration Limit-based GPS, following the process under **250.A.6.e**.

G **STATISTICAL PROCEDURES**

When evaluating the groundwater sampling event results, the Permittee shall:

G.1 within 30 days of completion of the laboratory analysis for each sampling event [**250.A.4.h.(2)**], determine whether or not there is a statistically significant increase over site background and GPS for each monitoring constituent using a method meeting the requirements of **250.A.4.h.(1)** and **A.4.g** and **D**.

G.1.a For GPS based on Federal Maximum Contaminant Level or ACLs, the comparison of analytical results from the downgradient wells shall be based on either a point to point comparison to the GPS, or a statistical comparison using 95% Lower Confidence Limit derived from at a minimum four independent sampling events completed during the compliance period.

G.1.b For GPS based on site background, the comparison of analytical results from the downgradient wells shall be based on a point to point comparison to the GPS.

G.2 For the purpose of this Permit, laboratory analysis is considered complete upon issuance of the analytical report under laboratory signature.

H **GPS EXCEEDANCE ACTIONS**

If the statistical comparisons required under the monitoring program show no exceedances, the Permittee shall continue monitoring groundwater within the current program.

If an exceedance is recognized, but considered suspect, the Permittee has the option to submit an Alternate Source Demonstration meeting the content requirements and timeframes of **250.A.5a, b**. Unless Director approval of the demonstration is obtained, the Permittee shall follow the sampling requirements and timeframes required of Phase 2 monitoring or Corrective Actions in response to a GPS exceedance as described in further

below.

H.1 When a Permittee has determined there has been an exceedance over GPS for one or more of the Phase 2 constituents, the Permittee shall upon the end of the 30-day SSI determination period allowed by **250.A.4.h.(2)**, notify the Director within the timeframe of **250.C.3.e.(3).(a)**. The notification must indicate which groundwater monitoring constituents have shown statistically significant increases over GPS and describe whether the Permittee shall:

H.1.a initiate groundwater Corrective Actions described under **260.C** within the timeframes of **260.C.1** including defining the horizontal and lateral extent of the GPS exceeding release [**260.C.1.a**], as well as the actions described under **260.C.1.b-e**.

I **RECORD-KEEPING REQUIREMENTS**

The Permittee shall retain all records identified under **250.E.1** as well as **530.B.1** and **B.2** throughout the active life (including closure) and post-closure care period. The records shall be retained at the facility or another location approved by the Director.

J **REPORTING REQUIREMENTS**

J.1 **Annual groundwater reports** containing, at a minimum, content under **250.E.2.a.(2)**, shall be submitted to the Director within the timeframes of **250.E.2.a.(1)**.

J.2 **Semi-annual groundwater reports** containing at a minimum, groundwater flow rate and direction determinations [**250.A.4.c**], statistical comparison results [**250.C.3**] and content defined under **250.E.2.b.(1)**, shall be submitted to the Department within the timeframes of **250.E.2.b.(1)**.

J.3. Within 30 days of establishing facility background in the First Determination program **250.C.2.b.(2)**, or re-establishing background due to the installation of new monitoring wells, or a change in sampling technique, the Permittee shall report the background values and statistical computations forming the basis for those values in a report entitled **Facility Background Determination Report**. While in Phase 2 program, the background determination results shall be submitted in the timeframe defined under **250.C.3.b.(2)**.

J.4 Within 44 days of well completion, the Permittee shall supply the Director a **Well Installation Report** containing the well number, surveyed elevation, boring log [**250.A.3.d**], casing length, total depth, and a completion diagram [**250.E.1.c**] for each monitoring well, along with a certification [**250.A.3.g**] from a qualified groundwater scientist that the monitoring wells have been installed in accordance with the submitted plans.

J.5 Within 44 days of well abandonment, the Permittee shall supply the Director a **Well**

Abandonment Report containing information including field methods utilized, and a certification from a qualified groundwater scientist verifying the well abandonment activities met all applicable requirements [300.E.1.c].

- J.6** Upon issuance of GPS, the Permittee shall place the GPS listing in the operating record [250.A.6.c] and update that record as needed upon any changes in GPS.

K **NOTIFICATION REQUIREMENTS**

K.1 **GPS SSI Notifications** shall be submitted to the Director within the timeframes noted under 250.C.3.e.(3).(a).

K.2 **Well Non-Performance Notifications** shall be submitted to the Director within 30 days of recognizing the non-performance issue in order to meet 530.C.1 - 3.

K.3 **Off-site Plume Notifications** shall be submitted to the affected landowner [260.C.1.b] and copied to the Director within 15-days of identifying the impacts.

L **MISCELLANEOUS ALLOWANCES**

L.1 **Use of Alternate Site Background.** The Permittee may request the Director allow site background to be developed using wells that are not hydrologically upgradient of the disposal unit as long as the request addresses the technical criteria contained under 250.A.4.e, and is certified by a qualified groundwater scientist. Until such time as Director approval is obtained, background shall be determined by sampling wells which are upgradient of the disposal unit and meet the requirements of 250.A.3.f.(2).

L.2 **Use of Alternate Statistical Method.** The Permittee may request the Director allow the use of an Alternate Statistical Method as long as the Permittee can demonstrate the alternate method can meet the technical criteria defined under 250.D.2. Until such time as Director approval is obtained, the statistical test(s) applied to site groundwater data shall be one from 250.D.1. Whichever method is approved for use at the site, the method should be listed in the facility **Groundwater Monitoring Plan** as required under 250.A.4.g.

L.3 **Verification Sampling.** The Permittee, at any time within the 30 day statistical determination period defined under 250.A.4.h.(2), may obtain verification samples. Undertaking verification sampling shall not alter the timeframes associated with determining or reporting a statistically significant increase as otherwise defined under 250.A.4.i.

L.4 **Data Validation.** The owner or operator may at any time within the 30 day statistical determination period defined under 250.A.4.h.(2), undertake third-party data validation of the analytical data received from the laboratory. Undertaking such validation efforts shall not alter the timeframes associated with determining or reporting a statistically significant increase as otherwise defined under 250.A.4.j.

- L.5** Sanitary Landfill Participation. Sanitary landfills which meet the criteria of **250.C.1.a** may monitor groundwater under the provisions of **250.C.2** or **3** designed for CDD and Industrial landfills.
- L.6** When the Permittee recognizes a failure to submit any relevant facts or has submitted incorrect information in any groundwater monitoring report to the Director, he shall, within 7-days, promptly submit such omitted facts or the correct information with a full explanation [**530.E**].
- L.7** Table 3.1 Column B Detect Deletions. The Permittee may request the Director allow previously detected Table 3.1 Column B constituents to be dropped from the semi-annual Phase 2 monitoring list as long as the request is certified by a qualified groundwater scientist and verifies that the Table 3.1 constituent(s) in question have not been detected for a period of two years [**250.C.3.b.(3)**].
- L.8** Return to First Determination Program. The Permittee may request the Director allow a return to First Determination monitoring as long as the request is certified by a qualified groundwater scientist and verifies that all Table 3.1 Column B constituent(s) have been found to be statistically at or below background levels for two consecutive Table 3.1 Column B sampling events [**250.C.3.e.(1)**].

M MISCELLANEOUS DEMONSTRATIONS

- M.1** To address an exceedance which is the result of something other than a release of solid waste constituents from the SWDU, the Permittee may submit a report entitled Alternate Source Demonstration, certified by a qualified groundwater scientist, for review by the Director within 90 days of providing the SSI notification unless the submission and approval timeframe has been extended by the Director for good cause [**250.A.5.b**].
- M.1.a** If a successful demonstration of an alternate source for the noted increase is made by the Permittee and approved by the Director within the 90 day timeframe, the Permittee may continue in the applicable monitoring program as defined in this Permit Module.
- M.1.b** If a successful demonstration of an alternate source for the noted increase is not made by the Permittee within the 90 day timeframe, the Permittee shall take actions required under **250.A.5.c.(3)** within Regulatory timeframes unless an extension has been granted by the Director.
- M.2** The Permittee may submit to the Director, a Multi-unit Groundwater Monitoring System Demonstration containing the content defined under **A.3.b** and certified by a qualified groundwater scientist, when he feels that the implementation of such a monitoring system will be as protective of human health and the environment as individual systems would be.

M.2.a If a successful demonstration is made and approved by the Director, the Permittee may discontinue use of individual monitoring systems and institute the monitoring of a multi-unit system.

M.2.b If a successful demonstration is not made, the Permittee shall initiate (or continue) to monitor individual networks under the applicable monitoring program.

M.3 The Permittee may request the Director suspend groundwater monitoring requirements by submitting a ***No-Potential-Migration Demonstration***, certified by a qualified groundwater scientist, meeting the technical requirements of **250.A.1.c**.

M.3.a If a successful demonstration is made and approved by the Director, the Permittee may suspend groundwater monitoring actions.

M.3.b If a successful demonstration is not made, the Permittee shall continue monitoring as required under **C.3**.

N **MODULE ATTACHMENTS**

As required under **470.A.1**, the Permittee must have Design Plans that includes detailed instructions concerning groundwater monitoring [**470.A.1.g**]. These detailed groundwater monitoring instructions must at a minimum cover the items listed under **300.A.4.a** and applicable information under **250** and **260**. The document containing these instructions, called the ***Groundwater Monitoring Plan***, shall be attached as **Attachment X-1** to Permit Module X.

It shall be the responsibility of the Permittee to update this monitoring plan as needed, which may include a Permit modification action as defined under **600.A – F**, if changes to the monitoring program have taken place since original Plan development.

O **LIMITATIONS/AUTHORITIES**

O.1 Solid waste shall not be deposited in or permitted to enter any surface waters or groundwater [**240.C.10**].

O.2 Should information contained in any Permittee authored attachment to this Module conflict with any requirement or condition of this Module, or requirements found within **9 VAC 20-81-10 et seq.**, as amended;

O.2.a the Module condition and/or Regulatory requirement shall prevail over the language in the Permittee supplied attachment [**35.D** and **490.E**] unless it can be demonstrated that a Variance from that regulatory requirement has been granted by the Director following the procedures under **700 et seq.**

O.3 The groundwater monitoring and reporting requirements set forth here are

minimum requirements. The Director may require, by amending the Permit, any owner or operator to install, operate, and maintain a groundwater monitoring system and program that contains requirements more stringent than those of the Regulations whenever it is determined that such requirements are necessary to prevent significant adverse effects on public health or the environment **[250.A.2.c]**.