PERMIT MODULE XI
ASSESSMENT MONITORING

Assessment monitoring is designed to ensure the earliest possible recognition of a leachate release to groundwater from a regulated solid waste management unit (SWMU) at levels which exceed groundwater protection standards.

XI.A. GROUNDWATER COMPLIANCE POINT

XI.A.1. Uppermost Aquifer

The compliance point for groundwater monitoring is the uppermost aquifer on site [9VAC20-81-250.A.2.a]. The uppermost aquifer 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 [9VAC20-81-250.A.3.f.(1.b and c)].

XI.A.2. Monitoring Well Locations

All wells in the monitoring network shall be installed within the permitted facility boundary [9VAC20-81-740.A], screened within the uppermost aquifer, and located at, or as close as practical to, the SWMU boundary [9VAC20-81-250.A.3.a.(2)] unless a variance meeting the requirements of 9VAC20-81-740.B. has been granted. No monitoring well serving the function defined under 9VAC20-81-250.A.3.a., can be located more than 500 feet away from the SWMU boundary [9VAC20-81-740.A].

XI.B. MONITORING NETWORK REQUIREMENTS

XI.B.1. Mandatory Performance Standards to be met

XI.B.1.a. Network requirements of 9VAC20-81-250.A.2., and A.3.

XI.B.1.b. Well requirements of 9VAC20-81-250.A.3.c., and f.

XI.B.1.c. Wells requiring replacement due to non-performance shall:

XI.B.1.c.(1) Be reported to the Department by the Permittee 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 [9VAC20-81-530.C.1].

XI.B.1.c.(2) 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 9VAC20-81-250.A.3.a.

XI.B.1.d. Any wells that require abandonment shall be sealed and abandoned in accordance with existing U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) guidance as well as any applicable state or local requirements.

XI.B.2. Operations and Maintenance

All wells shall be operated and maintained in accordance with requirements of 9VAC20-81-250.A.3.e.

XI.B.3. Well Designations

At a minimum, the well network shall meet requirements of 9VAC20-81-250.A.3.f.(2).

The following wells shall be included in the groundwater monitoring network:

Upgradient well	**Downgradient wells**	
TW-01U	TW-03D	TW-12D
	TW-04D	TW-13D
	TW-05D	TW-14D
	TW-06D	TW-15DR
	TW-08D	TW-16D
	TW-09D	TW-17D
	TW-10D	TW-18DR
	TW-11D	TW-19D

XI.C. AQUIFER INFORMATION

XI.C.1. Aquifer Data Acquisition - Requirements

XI.C.1.a. Static groundwater elevations shall be:

XI.C.1.a.(1) measured in all monitoring wells [9VAC20-81-250.A.4.c].

XI.C.1.a.(2) measured to an accuracy of 0.01 foot.

XI.C.1.a.(3) measured each time groundwater is sampled on site.

XI.C.1.a.(4) obtained from all wells in the network within a single 24 hour period to avoid temporal variations/fluctuations in the groundwater table.

XI.C.1.b. Each time groundwater is sampled on site, the Permittee shall determine the groundwater flow rate and direction [9VAC20-81-250.A.4.c] in the uppermost aquifer using methods accepted for use in EPA RCRA programs.

XI.C.2. Aquifer Data Acquisition - Response

XI.C.2.a. The Permittee shall evaluate the function of each of the wells included in the monitoring network each time groundwater is sampled.

XI.C.2.b. If the evaluation shows that one or more of the wells no longer functions in a manner that meets the requirements of 9VAC20-81-250.A.3.e., the Permittee shall:

XI.C.2.b.(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.

XI.C.2.b.(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 9VAC20-81-250.A.3.a.

XI.D. SAMPLING REQUIREMENTS

The Permittee shall meet:

XI.D.1. Field sampling and laboratory procedures of 9VAC20-81-250.A.4.a.

XI.D.2. Sampling and analytical methods of EPA SW-846 as amended [9VAC20-81-250.A.4.b].

XI.D.3. The prohibition against filtering of groundwater samples prior to analysis [9VAC20-81-250.A.4.b].

XI.D.4. The requirements to sample all Assessment constituents referenced under Table 3.1 Column B at least once a year [9VAC20-81-250.B.3.a].

XI.D.5. The requirements to sample all Detection constituents referenced under Table 3.1 Column A as well as those constituents in Column B that were previously detected [9VAC20-81-250.B.3.d.(2)] during the semi-annual or quarterly sampling events.

XI.E. SAMPLING FREQUENCY

XI.E.1. The Permittee shall, during the active life and post-closure care periods sample groundwater and analyze the required Table 3.1 constituents on at least a semi-annual basis [9VAC20-81-250.B.3.c.(2)] unless the quarterly wetlands provisions apply [9VAC20-81-250.B.1.e].

XI.E.2. The length of the semi-annual and quarterly sampling periods shall meet the requirements of 9VAC20-81-10.

XI.E.3. Upon triggering the need for Assessment monitoring, the initial Assessment sampling event shall be completed in a timeframe consistent with 9VAC20-81-250.B.3.a.

XI.F. DETERMINATION OF BACKGROUND & GPS

XI.F.1. The Permittee shall establish site-specific background values for all detected Assessment monitoring constituents (not previously detected during Detection monitoring) in manner consistent with the requirements of 9VAC20-81-250.A.4.d. - f. and the timeframes of B.3.c.(3).

XI.F.2. Groundwater Protection Standards (GPS) for each detected Assessment monitoring constituent shall be:

XI.F.2.a. proposed within timelines of 9VAC20-81-250B.3.d., and

XI.F.2.b. established using the process defined under 9VAC20-81-250A.6.b.

XI.F.3. GPS shall be updated as follows:

XI.F.3.a. For Federal Maximum Contaminant Level (MCL) based GPS or department approved background, as required under 9VAC20-81-250A.6.d.

XI.F.3.b. For Alternate Concentration Limit (ACL) based GPS, as required under 9VAC20-81-250A.6.e.

XI.G. STATISTICAL PROCEDURES

XI.G.1. When evaluating the groundwater sampling event results, the Permittee shall:

XI.G.1.a. use a statistical test method meeting the requirements of D., and

XI.G.1.b. within 30 days of completion of the laboratory analysis for each sampling event [9VAC20-81-250A.4.h.(2)], determine whether or not there is a statistically significant increase (SSI) over site background and GPS for each monitoring constituent using a method meeting the requirements of 9VAC20-81-250A.4.h.(1) and A.4.g.

XI.G.2. For GPS based on Federal MCL 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.

XI.G.3. 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.

XI.G.4. For the purpose of this Permit, laboratory analysis is considered complete upon issuance of the analytical report under laboratory signature.

XI.H. ADDRESSING GPS EXCEEDANCES

If the statistical comparisons required under the monitoring program show no exceedances, the Permittee shall continue monitoring groundwater within the current program [9VAC20-81-250.B.3.f.(2)] or follow the allowance under 9VAC20-81-250B.3.f.(1).

When a Permittee has determined there has been a SSI exceedance over GPS for one or more of the Assessment monitoring constituents, the Permittee shall:

XI.H.1. notify the Director within the timeframe of 9VAC20-81-250.B.3.f.(3a) which follows the close of the 30-day SSI period defined under 9VAC20-81-250A.4.h.(2),

XI.H.2. indicate which groundwater monitoring constituents have shown an SSI over GPS, and

XI.H.3. describe whether the Permittee shall:

XI.H.3.a. initiate Corrective Actions described under 9VAC20-81-260.C., within the timeframes of 260.C.1. including defining the horizontal and lateral extent of the GPS exceeding release [C.1.a], notifying any impacted landowners [C.1.b], assessing corrective measures or proposing a presumptive remedy [C.1.c], provide additional financial assurance [C.1.d], scheduling and holding a public meeting [C.1.e] or

XI.H.3.b. submit an Alternate Source Demonstration meeting the content requirements and timeframe of 9VAC20-81-250.A.5. Unless Director approval of the demonstration is obtained, the Permittee shall follow the requirements and timeframes required of Corrective Actions.

XI.I. RECORD-KEEPING REQUIREMENTS

The Permittee shall retain all records identified under 9VAC20-81-250.E.1., as well as 9VAC20-81-530.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.

XI.J. REPORTING REQUIREMENTS

XI.J.1. Annual groundwater reports containing at a minimum the content under 9VAC20-81-250.E.2.a., shall be submitted to the Director within the timeframes of E.2.a.(1).

XI.J.2. Semi-annual or quarterly groundwater evaluations containing at a minimum, groundwater flow rate and direction determinations [9VAC20-81-250.A.4.c], statistical comparisons results [9VAC20-81-250.C.2 & 3] and content defined under 9VAC20-81-250.E.2.b.(1) shall be submitted to the Department within the timeframes of E.2.b.(1).

XI.J.3. Within 30 days of establishing facility background, 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 necessary to determine the values in a report entitled Facility Background Determination Report.

XI.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, casing length, total depth, and a completion diagram for each monitoring well, along with a certification from a qualified groundwater scientist that the monitoring wells have been installed in accordance with the submitted plans [9VAC20-81-250.A.3.d. and g., and E.1.c].

XI.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 [9VAC20-81-250.E.1.c.

XI.J.6. Upon issuance of GPS, the Permittee shall place the GPS listing in the operating record [9VAC20-81-250.A.6.c] and update that record as needed upon any changes in GPS.

XI.K. NOTIFICATION REQUIREMENTS

XI.K.1. GPS SSI Notifications shall be submitted to the Director within the timeframes noted under 9VAC20-81-250.A.4.h.(2) and B.3.f.(3a).

XI.K.2. Well Non-Performance Notifications shall be submitted to the Director within 30 days of recognizing the non-performance of one or more wells in order to meet 9VAC20-81-530.C.1.-3.

XI.K.3. Table 3.1 Column B Detect Notifications shall be submitted to the Director within the timeframes noted under 9VAC20-81-250.B.3.c.(1).

XI.K.4. Return to Detection Monitoring Notification shall be submitted to the Director [9VAC20-81-250.B.3.f.(1)] no less than 30 days prior to re-instating Detection monitoring.

XI.K.5. Off-site Plume Notifications shall be submitted to the affected landowner [9VAC20-81-260.C.1.b] and copied to the Director within 15 days of identifying the impacts.

XI.L. MISCELLANEOUS ALLOWANCES

XI.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 SWMU as long as the request addresses the technical criteria contained under 9VAC20-81-250.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 SWMU and meet the requirements of 9VAC20-81-250.A.3.f.(2) and this Module.

XI.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 9VAC20-81-250.D.2. Until such time as Director approval is obtained, the statistical test(s) applied to site groundwater data shall be one from 9VAC20-81-250.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 9VAC20-81-250.A.4.g.

XI.L.3. Verification Sampling. The Permittee, at any time within the 30-day statistical determination period defined under 9VAC20-81-250.A.4.h.(2), may obtain verification samples if the initial review of analytical data suggests results which might not be an accurate reflection of groundwater quality. Undertaking verification sampling is a voluntary action and shall not alter the timeframes associated with determining or reporting an SSI as otherwise defined under 9VAC20-81-250.A.4.i.

XI.L.4. Data Validation. The Permittee may at any time within the 30-day statistical determination period defined under 9VAC20-81-250.A.4.h.(2), undertake third-

party data validation of the analytical data received from the laboratory. Undertaking such validation efforts are a voluntary action and shall not alter the timeframes associated with determining or reporting an SSI as otherwise defined under 9VAC20-81-250.A.4.j.

XI.L.5. The Permittee may request the Director allow an alternate frequency for the repeated sampling of the full Table 3.1 Column B constituent list as long as the request addresses the technical items contained under 9VAC20-81-250.B.3.b.(3), and is certified by a qualified groundwater scientist. Until such time as Director Approval is obtained, sampling for the full Table 3.1 Column B shall continue on an annual basis consistent with 9VAC20-81-250.B.3.a.

XI.L.6. In an effort to reduce sampling costs, the Permittee may request the Director:

XI.L.6.a. allow a subset of wells to be sampled for the annual full Table 3.1 Column B constituent list [9VAC20-81-250.B.3.b.(1)] as long as the request contains information showing that wells not included in the subset are 1] devoid of any Table 3.1 column B detects, 2] the well shows no exceedances over background for any Table 3.1 Column A constituents, and 3] the request is certified by a qualified groundwater scientist. Until such time as Director Approval is obtained, all site wells shall be sampled annually for the Table 3.1 Column B constituent list consistent with 9VAC20-81-250.B.3.a, and/or

XI.L.6.b. allow for the deletion of certain Table 3.1 Column B constituents from the sampling list [9VAC20-81-250.B.3.b.(2)] as long as the request contains information showing that the constituents are not reasonably expected to be in or derived from the waste mass, and the request is certified by a qualified groundwater scientist. Until such time as Director Approval is obtained, all site wells shall be sampled annually for the full Table 3.1 Column B constituent list consistent with 9VAC20-81-250.B.3.a.

XI.M. MISCELLANEOUS DEMONSTRATIONS

XI.M.1. To address an exceedance which is the result of something other than a release of solid waste constituents from the SWMU, 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 [9VAC20-81-250.A.5].

XI.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 Assessment monitoring program as defined in this Permit Module.

XI.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 9VAC20-81-250.B.3.f.(3) under the Regulatory timeframes unless an extension has been granted by the Director.

XI.M.2. The Permittee may submit to the Director, a Multi-unit Groundwater Monitoring System Demonstration containing the content defined under 9VAC20-81-250.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.

XI.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.

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

XI.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 9VAC20-81-250.A.1.c.

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

XI.M.3.b. If a successful demonstration is not made, the Permittee shall continue monitoring as required under 9VAC20-81-250.B.3.

XI.N. PERMIT DOCUMENTS

As required under 9VAC20-81-470.A.1., the Permittee must have an Operations Plan 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 9VAC20-81-250.A.4.a. The document containing these instructions is referred to as the Groundwater Monitoring and Reporting Plan.

It shall be the responsibility of the Permittee to update this Plan as needed, which may include a Permit amendment action as defined under 9VAC20-81-600.A - F., if changes to the monitoring program have taken place since original Plan development.

XI.O. LIMITATIONS

Solid waste shall not be deposited in or permitted to enter any surface waters or groundwater [9VAC20-81-120.C.10].

The groundwater monitoring and reporting requirements set forth here are minimum requirements. The Director may require, by amending the Permit, any Permittee 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 [9VAC20-81-250.A.2.c].

Should information contained in any Permittee authored document referenced by this Module conflict with any requirement or condition contained herein, or language found within 9VAC20-81-10 et seq., as amended; the Module condition and/or Regulatory requirement shall prevail over the language in the Permittee supplied document [see 9VAC20-81-35.D. and 9VAC20-81-490.F] unless it can be demonstrated that a Variance from that regulatory requirement has been granted by the Director under 9VAC20-81-700 et seq.

When the Permittee recognizes a failure to submit any relevant facts, or has submitted incorrect information in any groundwater monitoring report to the Director, she or he shall, within 7 days, promptly submit such omitted facts or the correct information with a full explanation [9VAC20-81-530.E]. Detection monitoring is designed to ensure the earliest possible recognition of a leachate release from a regulated solid waste management unit (SWMU).

END OF MODULE XI