Minimum Area Required for Seepage Pits, Based on One Gallon Liquid Per Day, and Based on the Percolation Rate of the Soil

Average Percolation Rate (Min/inch)	Minimum Area Per Gallon Per Day (Square feet)
10 or less	0.48
11 to 20	0.72
21 to 30	0.96
31 to 40	1.20
over 40	not acceptable

(c) Construction requirements are as follows:

1. Seepage pits shall be constructed within an excavation affording adequate working space and shall be constructed of stone, brick, cinder, precast concrete or concrete block, or similar material laid dry with open joints where permeable strata have been penetrated, except that if the seepage pit is not of circular construction or if the surrounding ground is subject to cave-in, all horizontal joints shall be mortared so as to prevent structural failure. The following requirements shall be met:

i. All joints above the inlet, in all cases, shall be made watertight;

ii. Before placement of backfill, all sidewall areas shall be scarified; and

iii. The bottom of the seepage pit shall be filled with coarse gravel to a depth of one foot unless the bottom is in a sand or gravel formation.

2. Seepage pits shall be backfilled according to the following procedure:

i. The space between the excavation and the seepage pit wall shall be backfilled with at least three inches of coarse gravel or filter material meeting New Jersey Department of Transportation's standards for coarse aggregate sizes 3, 4 and 24.

ii. Where cinder or concrete blocks are laid with core openings exposed, the space between the excavation and seepage pit wall shall be backfilled with at least six inches of two and one-half inch crushed stone or gravel.

iii. Backfill above the inlet shall be of earth similar to that found at the site which is free from large stones, tree stumps, broken masonry or waste construction material. and shall be thoroughly compacted by hand or mechanical tamping methods. The use of heavy machinery for this purpose is prohibited.

3. Covers shall be constructed of reinforced concrete, shall be a minimum of three inches in thickness, watertight, and shall be designed and constructed so as not to be damaged by any load which is likely to be placed upon them.

4. At least one access opening with a removable, watertight cover and a minimum dimension of 24 inches shall be provided. Access openings shall meet the following requirements:

i. Access shall be adequate to permit pumping out of the pit as well as inspection and maintenance of the inlet;

ii. When the cover of the seepage pit is deeper than 12 inches below finished grade, the access opening shall be extended to within 12 inches of finished grade by means of a concrete riser with cast-iron manhole cover;

iii. When the access opening is below finished grade, a permanent marker at finished grade shall be provided to indicate its location; and

iv. When the access opening is at or above finished grade, the cover shall be bolted, locked or otherwise secured to prevent access by children.

(d) Requirements for the submission of certifications are as follows:

1. Any facility qualifying for this permit by rule shall submit an as-built certification from a New Jersey licensed professional engineer which certifies that the system was designed and constructed in accordance with the requirements of this section. The certification and a NJPDES–1 form shall be submitted within 30 days of the completion of construction to:

NJDEP
Division of Water Quality
Bureau of Nonpoint Pollution Control
PO Box 029
Trenton, New Jersey 08625–0029

Amended by R.2004 d.47, effective February 2, 2004.
See: 35 N.J.R. 169(a), 35 N.J.R. 1331(a), 36 N.J.R. 813(a).
In (d), updated address.

APPENDIX A

EQUATION FOR AREA OF REVIEW

Modified Theis Equation for determining the "area of review" based on the assumption outlined in N.J.A.C. 7:14A–8.12

$$r := \frac{(2.25 \cdot K \cdot H \cdot t)^{0.5}}{s \cdot 10 \cdot X}$$

Where

$$X := \frac{4 \cdot \pi \cdot K \cdot H \cdot h_w - h_{b0} \cdot x \cdot S_p \cdot G_b}{2 \cdot 3 \cdot Q}$$

r = Radius of endangering influence from injection well (length)
K = Hydraulic conductivity of the injection zone (length time)
H = Thickness of the injection zone (length)
t = Time of injection (time)
S = Storage coefficient (dimensionless)
Q = Injection rate (volume/time)
h_{b0} = Observed original hydrostatic head of injection zone (length) measured from the base of the lowest underground source of drinking water
h_w = Hydrostatic head of underground source of drinking water (length) measured from the base of the lowest underground source of drinking water
SpG_b = Specific gravity of fluid in the injection zone (dimensionless)
π = 3.142 (dimensionless)

SUBCHAPTER 9. GROUND WATER MONITORING REQUIREMENTS FOR SANITARY LANDFILLS

7:14A–9.1 Scope and purpose

(a) This subchapter establishes the requirements for conducting ground water monitoring at sanitary landfills, including design of the ground water monitoring system, sampling, parameters and frequency of analyses, evaluation of data, recordkeeping and reporting.

(b) It is essential that the monitoring program provide adequate data over a sufficient period of time to accurately represent conditions and variations of background ground water quality and the hydrologic characteristic of the sanitary landfill. It is essential that the monitoring program be sufficient to ensure protection of ground water resources.

7:14A–9.2 Applicability

(a) The requirements in this subchapter apply to all sanitary landfills, except as provided at (c), (d) and (e) below.

(b) All sanitary landfills shall obtain a NJPDES DGW permit to conduct ground water monitoring as specified in this subchapter.

(c) Ground water monitoring pursuant to N.J.A.C. 7:14A–9.3 through 9.8 will be suspended for a municipal solid waste landfill (MSWLF) if the owner or operator can demonstrate that there is no potential for migration of any hazardous constituents from the MSWLF to the uppermost aquifer during the active life of the unit and the post-closure care period. This demonstration shall be certified by a qualified ground water scientist and approved by the Department and shall be based upon:

1. Site specific field collected measurements, sampling and analysis of physical, chemical, and biological processes affecting the contaminant fate and transport; and

2. Contaminant fate and transport predictions that maximize contaminant migration and consider impacts on human health and environment.

(d) For a sanitary landfill that is not a MSWLF under 40 CFR Parts 257 and 258, the Department may waive the requirement to sample for the complete list of Appendix A parameters when in detection mode, and for the complete list of the 40 C.F.R. 258 Appendix II parameters when in assessment or corrective monitoring mode. When the Department grants such a waiver, based upon the known characteristics of the waste and leachate quality, the contamination potential of the site, or historical permit conditions, the Department shall provide an alternate list of parameters to be monitored that are consistent with those factors. All sanitary landfills remain subject to all other requirements of N.J.A.C. 7:14A–9.3 through 9.8.

(e) The Department shall exempt a sanitary landfill from the requirement to obtain or maintain a NJPDES permit to conduct ground water monitoring as required by this subchapter when a ground water monitoring program equivalent to the provisions of this subchapter or 40 C.F.R. 258, whichever is more stringent, is being conducted pursuant to the requirements of the Industrial Site Recovery Act (N.J.S.A. 13:1K–6 et seq., as amended), the Spill Compensation and Control Act (N.J.S.A. 58:10–23.11), or the Procedures for Department Oversight of the Remediation of Contaminated Sites at N.J.A.C. 7:26C.

(f) For the purposes of this subchapter, a "qualified ground water scientist" is a scientist or engineer who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has sufficient training and experience in ground water hydrology as may be demonstrated by state registration, professional certifications, or completion of accredited university programs that enable the individual to make sound professional judgments regarding ground water monitoring, containment fate transport, and corrective action.

7:14A–9.3 Ground water monitoring system performance standards

(a) A ground water monitoring system shall consist of a sufficient number of wells, installed at appropriate locations and depths, to yield ground water samples from the uppermost aquifer that:

1. Represent the quality of background ground water that has not been affected by leakage. A determination of background ground water quality may include sampling of wells that are not hydraulically upgradient of the solid waste facility area where:

i. Hydrogeologic conditions do not allow the owner or operator to determine what wells are hydraulically upgradient; or

ii. Sampling at other wells will provide an indication of background ground water quality that is as representative or more representative than that provided by the upgradient wells; and

2. Represent the quality of ground water passing the relevant point of compliance specified by the Department under N.J.A.C. 7:14A–9.6. The downgradient monitoring system shall be installed at the relevant point of compliance specified by the Department that ensures detection of ground water contamination in the uppermost aquifer. When physical obstacles preclude installation of ground water monitoring wells at the relevant point of compliance, the down-gradient monitoring system may be installed at the closest practicable distance hydraulically downgradient from the relevant point of compliance specified by the Department that ensures detection of ground water contamination in the uppermost aquifer

(b) The Department shall approve a multiunit ground water monitoring system instead of separate ground water monitoring systems for each MSWLF when the facility has several units, provided the multiunit ground water monitoring system meets the requirement of (a) above and shall be as protective of human health and the environment as individual monitoring systems for each MSWLF, based on the following factors:

1. The number, spacing, and orientation of the sanitary landfills;

2. The hydrogeologic setting;

3. The site history;

4. The engineering design of the sanitary landfills; and

5. The type of waste accepted at the sanitary landfills.

(c) Monitoring wells shall be cased in a manner that maintains the integrity of the monitoring well bore hole. This casing shall be screened or perforated and packed with gravel or sand, where necessary, to enable collection of ground water samples. The annular space (that is, the space between the bore hole and well casing) above the sampling depth shall be sealed to prevent contamination of samples and the ground water. In addition to these general well construction standards, all monitoring wells shall be constructed in accordance with the edition of the Department's "Field Sampling Procedures Manual" applicable at the time of construction, an alternate method approved by the Department, or as set forth in the NJPDES-DGW permit.

1. The owner or operator of a sanitary landfill shall notify the Department that the design, installation, development, and decommissioning of any monitoring wells, piezometers and other measurement, sampling, and analytical devices documentation has been placed in the records maintained by the facility; and

2. The monitoring wells, piezometers, and other measurement, sampling, and analytical devices shall be operated and maintained so that they perform to design specifications for the duration of the monitoring program.

(d) The number, spacing, and depths of monitoring systems shall be:

1. Determined based upon site specific technical information that shall include thorough characterization of:

i. Aquifer thickness, ground water flow rate, ground water flow direction including seasonal and temporal fluctuations in ground water flow; and

ii. Saturated and unsaturated geologic strata and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining bed defining the lower boundary of the uppermost aquifer including but not limited to: thickness, stratigraphy, lithology, hydraulic conductivity, porosity and effective porosity.

(e) The ground water monitoring system shall perform in accordance with the standards established in this section, and shall consist of a minimum of four monitoring wells, placed such that there is one background quality well, and three hydraulically downgradient wells, located in the uppermost aquifer into which a discharge or leak is likely to occur.

(f) In addition to the minimum number of wells stated in (e) above, additional wells may be required in order to satisfy the performance standards for a ground water monitoring system in N.J.A.C. 7:14A–9.3(a). The number and spacing of these additional wells shall be capable of intercepting a contaminant plume emanating from a leachate leak located at the most downgradient edge of the waste area. This spacing shall be determined as specified in (d) above.

(g) The Department shall waive the requirements of (e) and (f) above based upon one of the following:

1. Performance of geophysical methods of analysis such as resistivity/conductivity that indicate or confirm that there are no contaminant leaks, or when there are leaks or discharges, that wells are placed in the most concentrated zones of any and all contaminant plumes emanating from the landfill; or

2. Another acceptable method approved in advance by the Department that demonstrates that the minimum number of monitoring wells is not necessary to indicate whether or not the landfill is leaking. A high quality contaminant transport model is one example of an acceptable method.

(h) The adequacy of the monitoring system shall be certified by a qualified ground water scientist and/or approved by the Department. The certification shall indicate that the performance standards of this section, or of the permit, are met. Within 14 days of this certification, the owner or operator shall notify the Department that the certification has been placed in the records maintained by the facility.

7:14A–9.4 General ground water monitoring well requirements

(a) In addition to monitoring requirements specified elsewhere in this subchapter, the following requirements shall apply to installation, maintenance, sampling and closure of monitoring wells:

1. Ground water monitoring wells shall be constructed in accordance with the edition of the Department's "Field Sampling Procedures Manual" applicable at the time of well construction, an alternate method approved by the Department, or as set forth in the NJPDES-DGW permit.

2. A well permit, as required by N.J.S.A. 58:4A–1 et seq., shall be obtained prior to the installation of any ground water monitoring well. A clear and accurate record or base map providing any monitoring well location, depth, elevation and achievable pumping rate shall be kept at the facility by the owner or operator and be made available to the Department.

3. Ground water sampling shall be conducted in accordance with the edition of the Department's "Field Sampling Procedures Manual" applicable at the time of well sampling, an alternate method approved by the Department, or as set forth in the NJPDES-DGW permit.

4. Wells shall be capped to prevent precipitation from entering the well bore hole or introduction of extraneous material and substances into the well which might invalidate analytical results. All monitoring wells shall be cased in a manner that maintains the integrity of the monitoring well bore hole. Wells shall be screened and packed with gravel or sand where necessary to enable sample collection at depths where appropriate. The annular space (that is, the space between the bore hole and well casing) above the sampling depth shall be sealed with a suitable material (for example, cement grout or bentonite slurry) to prevent contamination of samples and ground water.

5. The elevation of the top of the well casing for each ground water monitoring well shall be established and said elevation shall be permanently marked on the well casing. The elevation established shall be in relation to the New Jersey Geodetic Control Survey datum. Each monitoring well casing shall be permanently marked with a number assigned or approved by the Department. This number will typically be the well permit number issued with the permit to construct the well.

7:14A–9.5 Ground water monitoring program requirements for sanitary landfills

(a) The ground water monitoring program shall include sampling and analysis procedures that are designed to ensure monitoring results that provide an accurate representation of ground water quality at the background and downgradient wells installed in compliance with N.J.A.C. 7:14A–9.3(a). The owner or operator shall notify the Department, pursuant to the NJPDES permit, that the sampling and analysis program documentation has been placed in the operating record and the program shall include procedures and techniques for:

1. Sample collection;
2. Sample preservation and shipment;
3. Analytical procedures;
4. Chain of custody control; and
5. Quality assurance and quality control.

(b) The ground water monitoring program shall include sampling and analytical methods that are appropriate for ground water sampling and that accurately measure hazardous constituents and other monitoring parameters in ground water samples. Ground water samples shall not be field filtered prior to laboratory analysis.

(c) The sampling procedures and frequency shall be protective of human health and the environment.

(d) Ground water elevations shall be measured in each well immediately prior to purging, each time ground water is

sampled. The owner or operator shall determine the rate and direction of ground water flow each time ground water is sampled Ground water elevations in wells which monitor the same area shall be measured within a period of time short enough to avoid temporal variations in ground water flow which could preclude accurate determination of ground water flow rate and direction.

(e) The owner or operator shall establish background ground water quality in a hydraulically upgradient or background well(s) for each of the monitoring parameters or constituents required in the particular ground water monitoring program that applies to the sanitary landfill, as determined pursuant to N.J.A.C. 7:14A–9.7(a) or 9.8(a). Background ground water quality may be established at wells that are not located hydraulically upgradient from the sanitary landfill if it meets the requirements of N.J.A.C. 7:14A–9.3(a)1.

(f) The number of samples collected to establish ground water quality data shall be consistent with the appropriate statistical procedures determined pursuant to (g) below. The sampling procedures shall be those specified under N.J.A.C. 7:14A–9.7(b) for detection monitoring, N.J.A.C. 7:14A–9.8(b) and (d) for assessment monitoring, and N.J.A.C. 7:14A–9.9(b) for corrective measures.

(g) The owner or operator shall specify in the records maintained by the facility one of the following statistical methods to be used in evaluating ground water monitoring data for each hazardous constituent. The statistical test shall be conducted separately for each hazardous constituent in each well. Guidance for selecting and conducting the appropriate tests, and for evaluating the results of the tests is described in detail in Statistical Analysis of Ground Water Monitoring Data At RCRA Facilities—Interim Final Guidance Document, 4/89 (NTIS #PB 89–151–047. EPA/530–SW–89–026).

1. A parametric analysis of variance (ANOVA) followed by multiple comparison procedures to identify statistically significant evidence of contamination. The method shall include estimation and testing of the contrasts between the mean and the background mean levels for each compliance well for each constituent;

2. An analysis of variance (ANOVA) based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method shall include estimation and testing of the contrasts between each compliance well's median and the background median levels for each compliance well for each constituent;

3. A tolerance or prediction interval procedure in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the upper tolerance or prediction limit;

4. A control chart approach that gives control limits for each constituent; or

5. Another statistical test method that meets the performance standards of (h) below. The owner or operator shall place a justification for this alternative in the records maintained by the facility and notify the Department, pursuant to the NJPDES permit, of the use of this alternative test. The justification shall demonstrate that the alternative method meets the performance standards of (h) below.

(h) Any statistical method chosen pursuant to (g) above shall comply with the following performance standards, as appropriate:

1. The statistical method used to evaluate ground water monitoring data shall be appropriate for the distribution of chemical parameters or hazardous constituents. If the distribution of the chemical parameters or hazardous constituents is shown by the owner or operator to be inappropriate for a normal theory test, then the data must be transformed or a distribution free theory test must be used. If the distributions for the constituents differ, more than one statistical method shall be needed.

2. If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a ground water protection standard, the test shall be done at a type I error level no less than 0.01 for each testing period. If a multiple comparisons procedure is used the type I experiment wise error rate for each testing period shall be no less than 0.05. However, the type I error of no less than 0.01 for individual well comparison shall be maintained. The performance standard does not apply to tolerance intervals, prediction intervals or control charts.

3. If a control chart approach is used to evaluate ground water monitoring data, the specific type of control chart and its associated parameter values shall be protective of human health and the environment. The parameters shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

4. If a tolerance interval or a prediction interval is used to evaluate ground water monitoring data, the levels of confidence and, for tolerance intervals, the percentage of the population that the interval shall contain shall be protective of human health and the environment. These parameters shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

5. The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit (PQL) that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.