

3745-400-10

Ground water monitoring.

- (A) Ground water monitoring well system. The owner or operator of any facility disposing of debris on or after September 30, 1996, shall have a ground water monitoring well system unless the limits of debris placement meet the criteria in paragraph (B) of rule 3745-400-09 of the Administrative Code. Ground water monitoring shall be implemented ~~not~~ later than required by paragraph (R) of rule 3745-400-11 of the Administrative Code. The number, spacing, and depth of ground water monitoring wells included in the monitoring well system shall be capable of determining the quality of the ground water under the facility and be based on site-specific hydrogeologic information contained in the site characterization report required in paragraph (C) of rule 3745-400-09 of the Administrative Code. The monitoring well system is not required to be capable of determining the impact of the facility on the quality of the ground water beneath the facility.

The owner or operator shall describe the ground water monitoring well system in a plan as part of the facility design plan required by rule 3745-400-07 of the Administrative Code. The ground water monitoring well system plan shall be certified by a qualified ground water scientist that the system meets the requirements of paragraph (A) of this rule. If the ground water monitoring well system is constructed in phases, each phase shall be described by a qualified ground water scientist in the license application submitted prior to the placement of debris in the fill area relevant to that phase. The configuration of the ground water monitoring well system at all stages of the facility development shall be described using maps and a narrative.

- (1) The ground water monitoring well system shall include a sufficient number of background and downgradient monitoring wells, installed at appropriate locations and depths, to yield ground water samples from the first continuous significant zone of saturation underlying the facility.
- (2) All monitoring wells shall be designed, installed, and developed in a manner that allows the collection of ground water samples that are representative of ground water quality in the geologic unit being monitored. The ground water monitoring well system plan shall contain a drawing with specifications of the typical construction of any wells not yet constructed. At a minimum, the ground water monitoring well system plan shall include the following:
 - (a) Monitoring wells shall be cased in a manner that maintains the integrity of the monitoring well boreholes.
 - (b) The annular space, i.e., the space between the borehole and the well casing, above the sampling depth shall be sealed to prevent the contamination of the samples and the ground water.

- (c) The casing shall be screened or perforated and surrounded by sand or gravel in such a way that allows for the minimization of the passage of formation materials into the well.
- (3) Upon the installation of ground water monitoring wells, a construction certification report shall be submitted in accordance with rule 3745-400-08 of the Administrative Code.
- (B) Reporting. Annually, ~~at least by~~ not later than September thirtieth of each year, the owner or operator of a licensed facility shall determine the quality of ground water from wells that are part of the ground water monitoring well system required in paragraph (A) of this rule ~~and certain constituents in the leachate from the leachate collection system required in paragraph (F) of rule 3745-400-07 of the Administrative Code~~. The leachate quality data shall be used to supplement ground water monitoring data to determine if the leachate could be causing any changes in the quality of the ground water. These determinations shall be submitted at least annually to the licensing authority in a report signed by a qualified ground water scientist. The ground water monitoring determinations and report do not have to determine the impact of the facility on the quality of the ground water beneath the facility. The report shall provide the following:
 - (1) The ground water quality data required by paragraph (C) of this rule displayed using tables, tri-linear diagrams, stiff diagrams, time vs. concentration plots or any other format deemed appropriate by the qualified ground water scientist. The report shall describe any significant ground water quality changes over time and differences between up-gradient and down-gradient wells
 - (2) A narrative of the sampling and analysis procedures used. After the initial report submittal, only amendments to the already submitted sampling and analysis procedures need to be submitted with each subsequent report. The sampling and analysis procedures shall be protective of human health and the environment and shall be designed to ensure monitoring results that provide an accurate representation of ground water quality. The narrative of the sampling and analysis procedures shall include a detailed description of the equipment, procedures, and techniques used for the following:
 - (a) Measurement of ground water elevations.
 - (b) Collection of ground water samples, including the following:
 - (i) Well evacuation.

- (ii) Sample withdrawal.
 - (iii) Sample containers and handling.
 - (iv) Sample preservation.
- (c) Performance of field analysis, including the following:
- (i) Procedures and forms for recording raw data and the exact location, time, and facility-specific conditions associated with the data acquisition.
 - (ii) Calibration of field devices.
- (d) Decontamination of equipment.
- (e) Analysis of ground water samples.
- (f) Chain of custody control, including the following:
- (i) Standardized field tracking reporting forms to record sample custody in the field prior to and during shipment.
 - (ii) Sample labels containing all information necessary for effective sample tracking.
- (g) Field and laboratory quality assurance and quality control, including the following:
- (i) Collection of replicate samples.
 - (ii) Submission of field-bias blanks.
 - (iii) Potential interferences.
- (3) The ground water elevation for the first continuous significant zone of saturation underlying the facility documented on a potentiometric ~~map(s)~~[maps](#).

- (4) Documentation that the ground water monitoring well system at the facility continues to meet the requirements of rule 3745-400-09 of the Administrative Code.
 - (5) Documentation that the design, and methods of installation, and development, or abandonment of any monitoring wells, piezometers, and other measurement, sampling, and analytical devices that have been installed or abandoned since the last report.
 - (6) Documentation of the qualifications of the certifying qualified ground water scientist.
- (C) Ground water monitoring. The owner or operator shall determine the concentration or value of the parameters listed in the appendix ~~of~~ this rule in ground water and those additional leachate parameters required to be monitored in ground water pursuant to paragraph (B) of rule 3745-400-20 of the Administrative Code. The metals in the appendix to this rule shall include all species in ground water that contain the element and laboratory analysis shall be for total metals. For laboratory analysis of cyanide, the free species of cyanide shall be the required species in ground water and laboratory analysis. The concentration or value of the parameters shall be determined in accordance with the following schedule:
- (1) The owner or operator shall, whenever ground water samples are drawn from a monitoring well, field analyze the samples for parameters 1, 2, and 3 listed in the appendix ~~of~~ this rule.
 - (2) During the initial year of ground water monitoring, the owner or operator shall do the following:
 - (a) At least quarterly, determine the initial background concentration or value in ground water samples from all monitoring wells for parameters 1 to 19 listed in the appendix ~~of~~ this rule.
 - (b) During the first quarterly analysis of ground water quality, also determine the concentration or value for parameters 20 to 64 listed in the appendix ~~of~~ this rule.
 - ~~(c) At least once, determine the concentrations or values in the leachate for parameters 1 to 19 listed in the appendix of this rule.~~
 - (3) After the initial year, the owner or operator shall at least annually sample all monitoring wells ~~and the leachate collection system~~ and analyze the samples

for the parameters 1 to 19 listed in the appendix ~~of~~ to this rule and those additional leachate parameters required to be monitored in ground water by paragraph (B) of rule 3745-400-20 of the Administrative Code.

(D) Ground water assessment. The licensing authority or director may order the owner or operator to conduct a ground water assessment to determine the concentration of possible contaminants, and their extent and rate of migration within the ground water if the licensing authority or director determines that the facility may be affecting ground water quality. Such a determination shall be supported by leachate ~~quality reports, if required by paragraph (B) of this rule~~ sampling data and the following:

- (1) The ground water quality reports from a qualified ground water scientist.
- (2) Water quality data from documented leachate releases to seeps, springs, streams or other receptors.

(E) Ground water assessment plan and implementation. The ground water assessment shall include the submittal and implementation of a ground water assessment plan prepared by a qualified ground water scientist to the licensing authority or as required by the orders issued by the licensing authority or director.

- (1) The ground water assessment plan shall include the following sampling and analysis:
 - (a) Sampling of the affected ~~well(s)~~wells and background ~~well(s)~~wells and analysis of those samples for all leachate or leachate-derived constituents including those constituents listed in the appendix ~~of~~to this rule.
 - (b) ~~Within~~Not later than ninety days ~~of~~after sampling the affected ~~well(s)~~wells and background ~~well(s)~~wells as required by this paragraph, sampling of all other monitoring wells and analysis of those samples for those leachate or leachate-derived constituents found to be above background levels in the affected monitoring wells.
 - (c) Sampling at least annually all monitoring wells included in the ground water assessment and analysis of those samples for all the parameters listed in the appendix to this rule. A monitoring well shall be considered part of the ground water assessment if it is needed to determine the concentration of any contaminants, and their extent and rate of migration within the ground water.

- (2) The ground water assessment plan also shall include the following information:
- (a) A summary of the hydrogeologic conditions at the facility.
 - (b) A description of the detection monitoring program implemented by the facility, including the following:
 - (i) The number, location, depth, and construction of detection monitoring wells with documentation
 - (ii) A summary of detection monitoring ground water analytical data
 - (iii) A summary of statistical analyses previously applied to the data, if any.
 - (c) A detailed description of the investigatory approach to be followed during the assessment, including but not limited to the following:
 - (i) The proposed number, location, depth, installation method, and construction of additional monitoring wells for assessment purposes.
 - (ii) The proposed ~~method(s)~~methods for gathering additional hydrogeologic information.
 - (iii) The planned use of supporting methodology, e.g., soil, gas, or geophysical surveys.
 - (d) A detailed description of the techniques, procedures, and analytical equipment to be used for ground water sampling during the assessment, including, but not limited to the items listed in paragraph (B)(2) of this rule.
 - (e) A detailed description of the data evaluation procedures to be used, including but not limited to the following:
 - (i) Planned use of statistical data evaluation.
 - (ii) Planned use of computer programs ~~and/or~~ or models.

- (iii) Planned use of previously gathered information
 - (iv) Criteria which will be utilized to determine if additional assessment activities are warranted.
 - (f) A schedule of implementation.
- (3) All ground water monitoring wells not included in the ground water assessment shall continue to be monitored in accordance with paragraph (C) of this rule.
- (4) The owner or operator shall make a determination of the concentration of any contaminants, and their extent and rate of migration within the ground water within the time frame specified in the submitted ground water assessment plan or within the orders issued by the licensing authority or director. The owner or operator shall submit to the licensing authority or as required by the orders issued by the licensing authority or director, not later than fifteen days after making this determination, a written ground water assessment report prepared by a qualified ground water scientist containing an assessment of the ground water quality including all data generated as part of the implementation of the ground water assessment plan. If the qualified ground water scientist certifies that the facility has not impacted the quality of ground water beneath the facility, then the owner or operator may resume monitoring in accordance with paragraph (B) of this rule unless ordered by the licensing authority or director to continue ground water assessment.

Appendix
List of Ground Water Monitoring Parameters

<u>Compound or parameter</u>	<u>CAS RN</u>
(1) Temperature	
(2) pH	
(3) Specific conductance	
(4) Chemical oxygen demand	
(5) Sodium	7440-23-5
(6) Chloride	16887-00-6
(7) Bicarbonate/carbonate	
(8) Turbidity	
(9) Ammonia	7664-41-7
(10) Calcium	7440-70-2
(11) Iron	7439-89-6
(12) Lead	7439-92-1
(13) Magnesium	7439-95-4
(14) Manganese	7439-96-5
(15) Nitrate-nitrite	
(16) Phosphorous	
(17) Potassium	7440-09-7
(18) Sulfate	14808-79-8
(19) Zinc	7440-66-6
(20) Acetone	67-64-1
(21) Acrylonitrile	107-13-1
(22) Benzene	71-43-2
(23) Bromochloromethane	74-97-5
(24) Bromodichloromethane	75-27-4
(25) Bromoform; tribromomethane	75-25-2
(26) Carbon disulfide	75-15-0
(27) Carbon tetrachloride	56-23-5
(28) Chlorobenzene	108-90-7
(29) Chloroethane; ethyl chloride	75-00-3
(30) Chloroform; trichloromethane	67-66-3
(31) Dibromochloromethane; chlorodibromomethane	124-48-1
(32) 1,2-Dibromo-3-chloropropane; DBCP	96-12-8
(33) 1,2-Dibromoethane; ethylene dibromide; EDB	106-93-4
(34) o-Dichlorobenzene; 1,2-dichlorobenzene	95-50-1
(35) p-Dichlorobenzene; 1,4-dichlorobenzene	106-46-7
(36) trans-1,4-Dichloro-2-butene	110-57-6

(37)	1,1-Dichloroethane; ethylene chloride	75-34-3
(38)	1,2-Dichloroethane; ethylene dichloride	107-06-2
(39)	1,1-Dichloroethylene; 1,1-dichloroethene; vinylidene chloride	75-35-4
(40)	trans-1,2-Dichloroethylene; trans-1,2-dichloroethene	56-60-5
(41)	1,2-Dichloropropane; propylene dichloride	78-87-5
(42)	cis-1,3-Dichloropropene	10061-01-5
(43)	trans-1,3-Dichloropropene	10061-02-6
(44)	Ethylbenzene	100-41-4
(45)	2-Hexanone; methyl butyl ketone	591-78-6
(46)	Methyl bromide; bromomethane	74-83-9
(47)	Methyl chloride; chloromethane	74-87-3
(48)	Methylene bromide; dibromomethane	74-95-3
(49)	Methylene chloride; dichloromethane	75-09-2
(50)	Methyl ethyl ketone; MEK; 2-butanone	78-93-3
(51)	Methyl iodide; iodomethane	74-88-4
(52)	4-Methyl-2-pentanone; methyl isobutyl ketone	108-10-1
(53)	Styrene	100-42-5
(54)	1,1,1,2-Tetrachloroethane	630-20-6
(55)	1,1,2,2-Tetrachloroethane	79-34-5
(56)	Tetrachloroethylene; tetrachloroethene; perchloroethylene	127-18-4
(57)	Toluene	108-88-3
(58)	1,1,1-Trichloroethane; methylchloroform	71-55-8
(59)	1,1,2-Trichloroethane	79-00-5
(60)	Trichloroethylene; trichloroethene	79-01-6
(61)	1,2,3-Trichloropropane	96-18-4
(62)	Vinyl acetate	108-05-4
(63)	Vinyl chloride	75-01-4
(64)	Xylenes	
(65)	Antimony	7440-36-0
(66)	Arsenic	7440-38-2
(67)	Barium	7440-39-3
(68)	Beryllium	7440-41-7
(69)	Cadmium	7440-43-9
(70)	Chromium	7440-47-3
(71)	Cobalt	
(72)	Copper	7440-50-8
(73)	Nickel	7440-02-0
(74)	Selenium	7782-49-2
(75)	Silver	
(76)	Thallium	7440-28-0
(77)	Vanadium	7440-62-2

[Comment: Method 8260 of the USEPA SW 846 manual, "Testing Methods for Evaluating Solid Waste", is appropriate for monitoring leachate and the ground water to detect or assess the above VOCs.]