

ENVIRONMENTAL QUALITY

CHAPTER 50

SOLID WASTE MANAGEMENT

Subchapter 13

Ground Water Monitoring and Corrective Action

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Subchapter 13

Ground Water Monitoring and Corrective Action

17.50.1301 GENERAL PROVISIONS (1) All applicants, licensees, owners, and operators of solid waste management systems and facilities shall comply with this subchapter, except as otherwise specifically provided in this subchapter. Wherever there is a requirement imposed on an owner or operator in this subchapter, the licensee also shall comply with that requirement.

(2) Whenever a person, including an applicant or owner or operator, is required by this subchapter to submit a document for department approval of an action, the person may not take that action unless the person first submits a document containing all information necessary for the department to determine whether the action complies with the requirements of this subchapter and obtains department approval.

(3) When authorized by a court order or an agreement between the department and a landowner on whose property a violation of Title 75, chapter 10, part 2, MCA, or this subchapter has occurred, the department may act, either directly or through a third party, to physically remediate a violation of Title 75, chapter 10, part 2, MCA, or this subchapter.

(4) Whenever the department determines under this subchapter that any information, submittal, plan, factor, procedure, condition, criterion, requirement, or change is necessary to protect human health or the environment, it shall mail notification of the determination to the appropriate applicant, owner, operator, or licensee. (History: 75-10-204, MCA; IMP, 75-10-204, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

17.50.1302 DEFINITIONS In this subchapter, the following definitions apply:

(1) "Appendix I to 40 CFR Part 258" means the appendix from the July 1, 2008, Code of Federal Regulations, as set forth in ARM 17.50.1306.

(2) "Appendix II to 40 CFR Part 258" means the appendix from the July 1, 2008, Code of Federal Regulations, as set forth in ARM 17.50.1307.

(3) "Aquifer" has the meaning given in ARM 17.50.1002.

(4) "Class II landfill facility" has the meaning given in ARM 17.50.504.

(5) "Class IV landfill facility" has the meaning given in ARM 17.50.504.

(6) "Closure" has the meaning given in ARM 17.50.502.

(7) "Department" has the meaning given in ARM 17.50.502.

(8) "Disposal" has the meaning given in 75-10-203(3), MCA.

(9) "Existing," when used in conjunction with "unit" or a type of unit, has the meaning given in ARM 17.50.502.

(10) "Facility" has the meaning given in ARM 17.50.502.

(11) "Ground water" has the meaning given in ARM 17.50.502.

(12) "Landfill" has the meaning given in ARM 17.50.502.

(13) "Lateral expansion" has the meaning given in ARM 17.50.502.

(14) "New," when used in conjunction with "unit" or a type of unit, has the meaning given in ARM 17.50.502.

(15) "Operator" has the meaning given in ARM 17.50.502.

(16) "Owner" has the meaning given in ARM 17.50.502.

(17) "Post-closure care" has the meaning given in ARM 17.50.502.

(18) "Qualified ground water scientist" means 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 and related fields, as may be demonstrated by state registration, professional certifications, or completion of accredited university programs, that enable that individual to make sound professional judgments regarding ground water monitoring, contaminant fate and transport, and corrective action.

(19) "Saturated zone" means that part of the earth's crust in which all voids are filled with water.

(20) "Sludge" means any solid, semi-solid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility, exclusive of the treated effluent from a wastewater treatment plant.

(21) "Underground drinking water source" means:

(a) an aquifer supplying drinking water for human consumption; or

(b) an aquifer in which the ground water contains less than 10,000 mg/L total dissolved solids.

(22) "Unit" has the meaning given in ARM 17.50.502.

(23) "Uppermost aquifer" means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary. (History: 75-10-204, MCA; IMP, 75-10-204, 75-10-207, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

17.50.1303 APPLICABILITY OF LANDFILL GROUND WATER MONITORING AND CORRECTIVE ACTION (1) The requirements in this subchapter apply to Class II and Class IV landfill units, except as provided in (2).

(2) Ground water monitoring requirements under ARM 17.50.1304 through 17.50.1307 for a Class II or Class IV landfill unit may be suspended by the department if the owner or operator submits, and obtains department approval for, a demonstration that there is no potential for migration of a constituent in Appendix I or II to 40 CFR Part 258 (July 1, 2008) from that Class II or Class IV landfill unit to the uppermost aquifer or underground drinking water source, as required in ARM 17.50.1204, during the active life of the unit and the post-closure care period. This demonstration must be certified by a qualified ground water scientist, and must be based upon:

(a) site-specific field collected measurements, sampling, and analysis of physical, chemical, and biological processes affecting contaminant fate and transport; and

(b) contaminant fate and transport predictions that maximize contaminant migration and consider impacts on human health and environment.

(3) The owner or operator of an existing Class II or Class IV landfill unit, or a lateral expansion of an existing Class II or Class IV landfill unit, except one meeting the conditions of ARM 17.50.1203, shall comply with the ground water monitoring requirements of ARM Title 17, chapter 50, subchapters 5 through 14.

(4) A new Class II or Class IV landfill unit must be in compliance with the ground water monitoring requirements specified in ARM 17.50.1304 through 17.50.1307 before waste may be placed in the unit.

(5) Once ground water monitoring has begun at a Class II or Class IV landfill unit, the owner or operator shall continue to conduct ground water monitoring throughout the active life and post-closure care period of that unit, as specified in ARM 17.50.1404.

(6) The department may establish, and the owner or operator shall comply with, alternative schedules for demonstrating compliance with ARM 17.50.1304(6)(b), pertaining to notification of placement of certification in operating record; ARM 17.50.1306(5)(a), pertaining to notification that statistically significant increase (SSI) notice is in operating record; ARM 17.50.1306(5)(b) and (7), pertaining to an assessment monitoring program; ARM 17.50.1307(2), pertaining to sampling and analyzing constituents in Appendix II to 40 CFR Part 258 (July 1, 2008); ARM 17.50.1307(4)(a), pertaining to placement of notice (Appendix II constituents detected) in record and notification of notice in record; ARM 17.50.1307(7), pertaining to sampling for Appendix I and II; ARM 17.50.1307(7), pertaining to notification (and placement of notice in record) of SSI above ground water protection standard; ARM 17.50.1307(7)(a)(iv) and ARM 17.50.1308(1), pertaining to assessment of corrective measures; ARM 17.50.1309(1), pertaining to selection of remedy and notification of placement in record; ARM 17.50.1310(3)(e), pertaining to notification of placement in record (alternative corrective action measures); and ARM 17.50.1310(7), pertaining to notification of placement in record (certification of remedy completed). (History: 75-10-204, MCA; IMP, 75-10-204, 75-10-207, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

17.50.1304 GROUND WATER MONITORING SYSTEMS (1) An owner or operator required to monitor under this subchapter shall install a ground water monitoring system that consists of a sufficient number of wells, installed at appropriate locations and depths, to yield ground water samples from the uppermost aquifer, or underground drinking water source, as required in ARM 17.50.1204, that:

(a) represent the quality of background ground water that has not been affected by leakage from a unit. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the waste management area when:

(i) hydrogeologic conditions do not allow the owner or operator to determine the wells that 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

(b) represent the quality of ground water passing the relevant point of compliance specified by the department under ARM 17.50.1204(3). The downgradient monitoring system must be installed at the relevant point of compliance specified by the department under ARM 17.50.1204(3) that ensures detection of ground water contamination in the uppermost aquifer, or underground drinking water source, as required in ARM 17.50.1204. When physical obstacles preclude installation of ground water monitoring wells at the relevant point of compliance at existing units, the downgradient monitoring system may be installed at the closest practicable distance hydraulically downgradient from the relevant point of compliance specified by the department under ARM 17.50.1204(3) that ensures detection of ground water contamination in the uppermost aquifer, or underground drinking water source, as required in ARM 17.50.1204.

(2) The department may approve a multi-unit ground water monitoring system instead of separate ground water monitoring systems for each Class II or Class IV landfill unit when the facility has several units, if the multi-unit ground water monitoring system meets the requirements of (1) and will be as protective of human health and the environment as individual monitoring systems for each Class II or Class IV landfill unit, based on the following factors:

- (a) number, spacing, and orientation of the Class II or Class IV landfill unit;
- (b) hydrogeologic setting;
- (c) site history;
- (d) engineering design of the Class II or Class IV landfill unit; and
- (e) type of waste accepted at the Class II or Class IV landfill unit.

(3) Monitoring wells must be cased in a manner that maintains the integrity of the monitoring well bore hole. This casing must be screened or perforated and packed with gravel or sand, where necessary, to enable collection of ground water samples. The annular space, i.e., the space between the bore hole and well casing, above the sampling depth must be sealed to prevent contamination of samples and the ground water.

(4) The owner or operator of a Class II or Class IV landfill unit required to monitor under this subchapter shall:

(a) submit a ground water monitoring plan to the department for approval that includes:

- (i) the location, number, depth, design, installation, development, and decommission of any monitoring wells;
- (ii) plans for the design, installation, development, and decommission of piezometers or other measurement, sampling, and analytical devices; and
- (iii) discussions of the anticipated ground water monitoring system and schedule of sampling for closed portions of the facility, if applicable;

(b) update the ground water monitoring plan at least once every five years, except that a ground water monitoring plan for a closed facility must be updated at least every ten years; and

(c) notify the department that the approved ground water monitoring systems plan has been placed in the operating record.

(5) The monitoring wells, piezometers, and other measurement, sampling, and analytical devices must be operated and maintained so that they perform to design specifications throughout the life of the monitoring program.

(6) The number, spacing, and depths of monitoring wells must be:

(a) determined based upon site-specific technical information that must 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 units and fill materials overlying the uppermost aquifer, or underground drinking water source, as required in ARM 17.50.1204, materials comprising the uppermost aquifer, or underground drinking water source, as required in ARM 17.50.1204, and materials comprising the confining unit defining the lower boundary of the uppermost aquifer, or underground drinking water source, as required in ARM 17.50.1204, including, but not limited to, thicknesses, stratigraphy, lithology, hydraulic conductivities, porosities, and effective porosities; and

(b) be certified by a qualified ground water scientist and approved by the department. Within 14 days of this certification, the owner or operator shall notify the department that the certification has been placed in the operating record.

(7) The drilling and construction of a ground water monitoring well at a solid waste management system may be subject to the requirements of Title 36, chapter 21, subchapters 4, 7, and 8. (History: 75-10-204, MCA; IMP, 75-10-204, 75-10-207, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

17.50.1305 GROUND WATER SAMPLING AND ANALYSIS

REQUIREMENTS (1) An owner or operator required to monitor ground water under this subchapter shall implement a ground water monitoring program that includes consistent 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 ARM 17.50.1304(1). The owner or operator shall submit to the department for approval a sampling and analysis plan that documents sampling and analysis procedures and techniques for:

(a) sample collection;

(b) sample preservation and shipment;

(c) analytical procedures;

(d) chain of custody control; and

(e) quality assurance and quality control.

(2) The owner or operator of a facility shall notify the department that the approved sampling and analysis plan has been placed in the operating record.

(3) The ground water monitoring program required in (1) must include sampling and analytical methods that are appropriate for ground water sampling and that accurately measure constituents and parameters that are required to be monitored in ground water samples. Any requirement in this subchapter for analysis of the concentration in ground water of a metal listed in Appendix I or II to 40 CFR Part 258 (July 1, 2008) is for analysis of the dissolved metal concentration, unless another alternative for analysis is approved in writing by the department on an individual facility basis.

(4) The sampling procedures and frequency must be protective of human health and the environment.

(5) Ground water elevations must 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 that monitor the same waste management area must be measured within a period of time short enough to avoid temporal variations in ground water flow that could preclude accurate determination of ground water flow rate and direction.

(6) The owner or operator shall establish background ground water quality in a hydraulically upgradient or background well(s) for each of the constituents and parameters required in the particular ground water monitoring program that applies to the Class II or Class IV landfill unit, as determined under ARM 17.50.1306(1) or 17.50.1307(1). Background ground water quality may be established at wells that are not located hydraulically upgradient from the Class II and Class IV landfill unit if they meet the requirements of ARM 17.50.1304(1)(a).

(7) The number of samples collected to establish ground water quality data must be consistent with the appropriate statistical procedures determined pursuant to (8). The sampling procedures must be those specified under ARM 17.50.1306(2) for detection monitoring, ARM 17.50.1307(2) and (4) for assessment monitoring, and ARM 17.50.1308(2) for corrective action.

(8) The owner or operator shall specify in the operating record one of the statistical methods in (8)(a) through (e) to be used in evaluating ground water monitoring data for each constituent or parameter. The statistical test chosen must be conducted separately for each constituent and parameter in each well:

(a) a parametric analysis of variance (ANOVA) followed by multiple comparisons procedures, to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's mean levels and the background mean levels for each constituent or parameter;

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

(c) a tolerance or prediction interval procedure in which an interval for each constituent or parameter is established from the distribution of the background data, and the level of each constituent or parameter in each compliance well is compared to the upper tolerance or prediction limit;

(d) a control chart approach that provides control limits for each constituent or parameter; or

(e) another statistical test method that meets the performance standards of (9). The owner or operator shall place a justification for this alternative in the operating record and notify the department of the use of this alternative test. The justification must demonstrate that the alternative method meets the performance standards of (9).

(9) Any statistical method chosen under (8) must comply with the following performance standards, as appropriate:

(a) the statistical method used to evaluate ground water monitoring data must be appropriate for the distribution of constituents and parameters. If the distribution of the constituents or parameters is shown by the owner or operator to be inappropriate for a normal theory test, then the data should be transformed or a distribution-free theory test should be used. If the distributions for the constituents or parameters differ, more than one statistical method may be needed;

(b) if an individual well comparison procedure is used to compare a constituent or parameter concentration in an individual compliance well with background constituent or parameter concentrations or a ground water protection standard, the test must be performed 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 must be no less than 0.05; however, the Type I error of no less than 0.01 for individual well comparisons must be maintained. This performance standard does not apply to tolerance intervals, prediction intervals, or control charts;

(c) if a control chart approach is used to evaluate ground water monitoring data, the specific type of control chart and its associated parameter values must be protective of human health and the environment. The parameters must 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 and parameter of concern;

(d) if a tolerance interval or a predictional 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 must contain, must be protective of human health and the environment. These parameters must 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 or parameter of concern;

(e) the statistical method must 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 must be the lowest concentration level that reliably can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility; and

(f) if necessary, the statistical method must include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

(10) The owner or operator shall determine whether there is a statistically significant increase over background values for each constituent or parameter required to be monitored in the particular ground water monitoring program that applies to the Class II or Class IV landfill unit, as determined under ARM 17.50.1306(1) or 17.50.1307(1).

(11) In determining whether a statistically significant increase described in (10) has occurred, the owner or operator shall:

(a) compare the ground water quality for each constituent or parameter at each monitoring well designated pursuant to ARM 17.50.1304(1)(b) to the background value of that constituent or parameter, according to the statistical procedures and performance standards specified under (8) and (9); and

(b) within a reasonable period of time after completing sampling and analysis, determine, for each monitoring well, whether there has been a statistically significant increase over background levels. (History: 75-10-204, MCA; IMP, 75-10-204, 75-10-207, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

17.50.1306 DETECTION MONITORING PROGRAM (1) The owner or operator of a Class II or Class IV landfill unit shall conduct detection monitoring for the unit at all ground water monitoring wells defined under ARM 17.50.1304(1)(a) and (b). At a minimum, that detection monitoring must include monitoring for each constituent in Appendix I to 40 CFR Part 258 (July 1, 2008), set forth below, unless exempted in (2), and each parameter in any alternative list established under (3) for which the department has mailed notification to the owner or operator.

(2) The department may exempt an owner or operator of a Class II or Class IV landfill unit from monitoring a constituent in Appendix I to 40 CFR Part 258 (July 1, 2008) if the owner or operator makes a written demonstration, approved by the department, that the exempted constituent is not reasonably expected to be in, or derived from, the waste contained in the unit.

(3) The department may establish an alternative list of inorganic indicator parameters for a Class II or Class IV landfill unit, in lieu of some or all of the heavy metals that comprise constituents 1 through 15 in Appendix I to 40 CFR Part 258 (July 1, 2008), if the department determines that the parameters in the alternative list provide a reliable indication of inorganic releases from the Class II or Class IV landfill unit to the ground water. In determining parameters in the alternative list, the department shall consider the following factors:

(a) the types, quantities, and concentrations of constituents in wastes managed at the Class II or Class IV landfill unit;

(b) the mobility, stability, and persistence of waste constituents or their reaction products in the unsaturated zone beneath the Class II or Class IV landfill unit;

(c) the detectability of indicator parameters, waste constituents, and reaction products in the ground water; and

(d) the concentration or values and coefficients of variation of indicator parameters or constituents in the background ground water.

(4) An owner or operator of a Class II or Class IV landfill unit required to conduct ground water monitoring under this subchapter shall monitor for all constituents and parameters required in this rule at least semiannually during the active life of the facility, including closure and the post-closure period. During the first semiannual sampling event, a minimum of four independent samples from each background and downgradient well must be collected and analyzed for all constituents and parameters for which monitoring is required in this rule. At least one sample from each background and downgradient well must be collected and analyzed during subsequent semiannual sampling events. The department may specify an appropriate alternative frequency for repeated sampling and analysis for constituents and parameters for which monitoring is required in this rule during the active life of the unit, including closure and the post-closure care period. An alternative frequency during the active life of the unit, including closure, may be no less frequent than annual. An alternative frequency must be based on consideration of the following factors:

- (a) lithology of the aquifer and unsaturated zone;
- (b) hydraulic conductivity of the aquifer and unsaturated zone;
- (c) ground water flow rates;
- (d) minimum distance between upgradient edge of the Class II or Class IV landfill unit and downgradient monitoring well screen (minimum distance of travel); and

- (e) resource value of the aquifer.

(5) If the owner or operator of a Class II or Class IV landfill unit, or the department, determines, pursuant to ARM 17.50.1305(8), that there is a statistically significant increase over the background level for a constituent or parameter other than pH required to be monitored in this rule, at any monitoring well at the boundary specified under ARM 17.50.1304(1)(b), the owner or operator shall:

- (a) within 14 days after this determination, or notification by the department of the department's determination, place a notice in the operating record indicating each constituent that has shown a statistically significant change from a background level, and notify the department that this notice was placed in the operating record; and

- (b) submit for department approval, and implement, an assessment monitoring program meeting the requirements of ARM 17.50.1307, within 90 days after the determination was made, or notice from the department was received, except as provided for in (7).

(6) If pH is a parameter of an alternative list established under (3), and if the department determines that there has been a statistically significant decrease from background in pH, at a monitoring well at the boundary specified under ARM 17.50.1304(1)(b), and that assessment monitoring is necessary to protect human health or the environment, the department shall notify the owner or operator of the Class II or Class IV landfill unit of the determination, and the owner or operator shall give notice and establish assessment monitoring as required in (5).

(7) An owner or operator required to establish an assessment monitoring program under (5) or (6) may submit for department approval a demonstration that a source other than a Class II or Class IV landfill unit caused the statistically significant change described in (5) or (6) or that it resulted from error in sampling, analysis, or statistical evaluation, or from natural variation in ground water quality. A report documenting this demonstration must be certified by a qualified ground water scientist and placed in the operating record. If the department approves the demonstration, the owner or operator is not required to commence assessment monitoring, but shall continue detection monitoring as specified in this rule. If the department has not approved a demonstration, within 90 days after the determination described in (5) or (6) has been made, the owner or operator shall establish an assessment monitoring program as required in ARM 17.50.1307.

Appendix I to 40 CFR Part 258 (July 1, 2008)
Constituents for Detection Monitoring

Common name ¹	CAS RN ²
Inorganic Constituents:	
(1) Antimony	
(2) Arsenic	
(3) Barium	
(4) Beryllium	
(5) Cadmium	
(6) Chromium	
(7) Cobalt	
(8) Copper	
(9) Lead	
(10) Nickel	
(11) Selenium	
(12) Silver	
(13) Thallium	
(14) Vanadium	
(15) Zinc	
Organic Constituents:	
(16) Acetone	67-64-1
(17) Acrylonitrile	107-13-1
(18) Benzene	71-43-2
(19) Bromochloromethane	74-97-5
(20) Bromodichloromethane	75-27-4
(21) Bromoform; Tribromomethane	75-25-2
(22) Carbon disulfide	75-15-0
(23) Carbon tetrachloride	56-23-5
(24) Chlorobenzene	108-90-7
(25) Chloroethane; Ethyl chloride	75-00-3

(26) Chloroform; Trichloromethane	67-66-3
(27) Dibromochloromethane; Chlorodibromomethane	124-48-1
(28) 1,2-Dibromo-3-chloropropane; DBCP	96-12-8
(29) 1,2-Dibromoethane; Ethylene dibromide; EDB	106-93-4
(30) o-Dichlorobenzene; 1,2-Dichlorobenzene	95-50-1
(31) p-Dichlorobenzene; 1,4-Dichlorobenzene	106-46-7
(32) trans-1, 4-Dichloro-2-butene	110-57-6
(33) 1,1-Dichlorethane; Ethylidene chloride	75-34-3
(34) 1,2-Dichlorethane; Ethylene dichloride	107-06-2
(35) 1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride	75-35-4
(36) cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2
(37) trans-1, 2-Dichloroethylene; trans-1,2-Dichloroethene	156-60-5
(38) 1,2-Dichloropropane; Propylene dichloride	78-87-5
(39) cis-1,3-Dichloropropene	10061-01-5
(40) trans-1,3-Dichloropropene	10061-02-6
(41) Ethylbenzene	100-41-4
(42) 2-Hexanone; Methyl butyl ketone	591-78-6
(43) Methyl bromide; Bromomethane	74-83-9
(44) Methyl chloride; Chloromethane	74-87-3
(45) Methylene bromide; Dibromomethane	74-95-3
(46) Methylene chloride; Dichloromethane	75-09-2
(47) Methyl ethyl ketone; MEK; 2-Butanone	78-93-3
(48) Methyl iodide; Iodomethane	74-88-4
(49) 4-Methyl-2-pentanone; Methyl isobutyl ketone	108-10-1
(50) Styrene	100-42-5
(51) 1,1,1,2-Tetrachloroethane	630-20-6
(52) 1,1,2,2-Tetrachloroethane	79-34-5
(53) Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	127-18-4
(54) Toluene	108-88-3
(55) 1,1,1-Trichloroethane; Methylchloroform	71-55-6
(56) 1,1,2-Trichloroethane	79-00-5
(57) Trichloroethylene; Trichloroethene	79-01-6
(58) Trichlorofluoromethane; CFC-11	75-69-4
(59) 1,2,3-Trichloropropane	96-18-4
(60) Vinyl acetate	108-05-4
(61) Vinyl chloride	75-01-4
(62) Xylenes	1330-20-7

¹Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals

²Chemical Abstract Service registry number

(History: 75-10-204, MCA; IMP, 75-10-204, 75-10-207, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

17.50.1307 ASSESSMENT MONITORING PROGRAM (1) An owner or operator of a Class II or Class IV landfill unit shall conduct assessment monitoring at that unit as required in ARM 17.50.1306 and this rule.

(2) Within 90 days after being required by ARM 17.50.1306 to establish an assessment monitoring program, and annually thereafter, the owner or operator shall sample and analyze the ground water for all constituents identified in Appendix II to 40 CFR Part 258 (July 1, 2008), set forth below. A minimum of one sample from each downgradient well must be collected and analyzed during each sampling event. For any constituent detected in the downgradient wells as a result of monitoring of all constituents in Appendix II to 40 CFR Part 258 (July 1, 2008), a minimum of four independent samples from each background and downgradient well must be collected and analyzed to establish background for the constituent. The owner or operator shall conduct assessment monitoring for constituents in Appendix II to 40 CFR Part 258 (July 1, 2008) for any subset of wells specified by the department. The department may exempt an owner or operator of a Class II or Class IV landfill unit from monitoring a constituent in Appendix II to 40 CFR Part 258 (July 1, 2008) if the owner or operator makes a written demonstration, approved by the department, that the exempted constituent is not reasonably expected to be in, or derived from, the waste contained in the unit.

(3) The department may specify, and an owner or operator shall comply with, an appropriate alternate frequency for repeated sampling and analysis of the constituents in Appendix II to 40 CFR Part 258 (July 1, 2008) required by (2), during the active life and closure and post-closure care periods of the unit, considering the following factors:

- (a) lithology of the aquifer and unsaturated zone;
- (b) hydraulic conductivity of the aquifer and unsaturated zone;
- (c) ground water flow rates;
- (d) minimum distance between upgradient edge of the Class II or Class IV landfill unit and downgradient monitoring well screen (minimum distance of travel);
- (e) resource value of the aquifer; and
- (f) nature (fate and transport) of any constituents detected by monitoring required by this rule.

(4) After obtaining the results from the initial or subsequent sampling events required in (2), the owner or operator shall:

- (a) within 14 days, place a notice in the operating record identifying the constituents in Appendix II to 40 CFR Part 258 (July 1, 2008) that have been detected and notify the department that this notice has been placed in the operating record;

(b) within 90 days, and on at least a semiannual basis thereafter, resample all wells described in ARM 17.50.1304(1), conduct analyses for all constituents in Appendix I to 40 CFR Part 258 (July 1, 2008) or in the alternative list of parameters established in accordance with ARM 17.50.1306(3), and for those constituents in Appendix II to 40 CFR Part 258 (July 1, 2008) that are detected by monitoring required by (2), and record their concentrations in the facility operating record. At least one sample from each background and downgradient well must be collected and analyzed during these sampling events. If specified by the department, the owner or operator shall conduct sampling and analyses under this subsection at an alternative frequency during the active life and closure and the post-closure care periods of the unit. The alternative frequency may be no less frequent than annual during the active life of the unit, including closure. The alternative frequency must be based on consideration of the factors specified in (3);

(c) establish the background concentration for each constituent or parameter detected pursuant to (2) or (4)(b); and

(d) establish the ground water protection standard for each constituent or parameter detected pursuant to (2) or (4)(b). The ground water protection standard must be established in accordance with (8).

(5) If the owner or operator determines that concentrations of all constituents in Appendix II to 40 CFR Part 258 (July 1, 2008) are at or below background values, using the statistical procedures described in ARM 17.50.1305(8), for two consecutive sampling events, the owner or operator shall submit this determination to the department for approval and may, if approved, return to detection monitoring.

(6) If the owner or operator determines, using the statistical procedures in ARM 17.50.1305(8), that the concentration of a constituent in Appendix II to 40 CFR part 258 (July 1, 2008) is above background, but that all concentrations are below the ground water protection standard established under (8), the owner or operator shall submit this determination to the department for approval and shall continue assessment monitoring in accordance with this rule, unless notified otherwise by the department.

(7) If the owner, operator, or department determines, using the same statistical procedures as required in ARM 17.50.1305(8), that, in any sampling event required in this rule, there has been a statistically significant increase above the ground water protection standard established under (8) in the concentration of a constituent in Appendix II to 40 CFR part 258 (July 1, 2008), the owner or operator shall, within 14 days, place a notice in the operating record identifying each constituent in Appendix II to 40 CFR part 258 (July 1, 2008) that has exceeded the ground water protection standard and notify the department and all appropriate local government officials that the notice has been placed in the operating record. The owner or operator shall either:

(a) comply with (7)(a)(i) through (iv), as follows:

(i) characterize the nature and extent of the release by installing additional monitoring wells as necessary;

(ii) install at least one additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well in accordance with (4)(b);

(iii) notify all persons who own the land or reside on the land that directly overlies any part of the plume of contamination, if contaminants have migrated off-site if indicated by sampling of wells in accordance with (7)(a); and

(iv) initiate an assessment of corrective measures as required by ARM 17.50.1308, within 90 days; or

(b) demonstrate that a source other than a Class II or Class IV landfill unit caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or from natural variation in ground water quality. A report documenting this demonstration must be certified by a qualified ground water scientist and submitted to the department for approval and placed in the operating record. If the demonstration is approved, the owner or operator shall continue monitoring in accordance with the assessment monitoring program required by this rule, and may return to detection monitoring if the concentrations of all of the constituents in Appendix II to 40 CFR Part 258 (July 1, 2008) are at or below background levels as specified in (5). Until the department approves a demonstration, the owner or operator shall comply with (7), including initiating an assessment of corrective measures.

(8) The owner or operator shall establish a ground water protection standard for each constituent in Appendix II to 40 CFR Part 258 (July 1, 2008) and parameter in the alternative list in ARM 17.50.1306(3) detected in the ground water. The ground water protection standard must be:

(a) for a constituent for which a maximum contaminant level (MCL) has been promulgated under Montana ground water quality standards, the MCL for that constituent;

(b) for a constituent for which an MCL has not been promulgated, the background concentration for the constituent established from wells in accordance with ARM 17.50.1304(1)(a);

(c) for a constituent for which the background level is higher than the MCL identified under (8)(a) or health based levels identified under (9)(a), the background concentration; or

(d) for a constituent or parameter in the alternative list in ARM 17.50.1306(3) for which a ground water quality standard has been established pursuant to (9), that ground water quality standard.

(9) If the department believes a standard is needed for a constituent or parameter in the alternative list in ARM 17.50.1306(3) for which an MCL or ground water quality standard has not been established by Montana law or rule, the department shall propose to the Board of Environmental Review established in 2-15-3502, MCA, the adoption of a ground water quality standard for that constituent or parameter. The ground water quality standard proposed must be health-based and set at an appropriate level that satisfies the following criteria:

(a) the level is derived in a manner consistent with EPA guidelines for assessing the health risks of environmental pollutants (51 FR 33992, 34006, 34014, 34028, Sept. 24, 1986);

(b) the level is based on scientifically valid studies conducted in accordance with the Toxic Substances Control Act Good Laboratory Practice Standards (40 CFR Part 792) or equivalent requirements;

(c) for carcinogens, the level represents a concentration associated with an excess lifetime cancer risk level, due to continuous lifetime exposure, within the 1×10^{-4} to 1×10^{-6} range; and

(d) for systemic toxicants, the level represents a concentration to which the human population, including sensitive subgroups, could be exposed to on a daily basis that is likely to be without appreciable risk of deleterious effects during a lifetime. For purposes of this subchapter, systemic toxicants include toxic chemicals that cause effects other than cancer or mutation.

(10) In proposing a ground water quality standard under (9), the department shall consider the following:

(a) multiple contaminants in the ground water;

(b) exposure threats to sensitive environmental receptors; and

(c) other site-specific exposure or potential exposure to ground water.

Appendix II to 40 CFR Part 258 (July 1, 2008)
List of Hazardous Inorganic and Organic Constituents

Common name ¹	CAS RN ²	Chemical abstracts service index name ³
Acenaphthene	83-32-9	Acenaphthylene, 1,2-dihydro-
Acenaphthylene	208-96-8	Acenaphthylene
Acetone	67-64-1	2-Propanone
Acetonitrile; Methyl cyanide	75-05-8	Acetonitrile
Acetophenone	98-86-2	Ethanone, 1-phenyl-
2-Acetylaminofluorene; 2-AAF	53-96-3	Acetamide, N-9H-fluoren-2-yl-
Acrolein	107-02-8	2-Propenal
Acrylonitrile	107-13-1	2-Propenenitrile

Common name ¹	CAS RN ²	Chemical abstracts service index name ³
Aldrin	309-00-2	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1,4,4a,5,8,8a)-
Allyl chloride	107-05-1	1-Propene, 3-chloro-
4-Aminobiphenyl	92-67-1	[1,1'-Biphenyl]-4-amine
Anthracene	120-12-7	Anthracene
Antimony		Antimony
Arsenic		Arsenic
Barium		Barium
Benzene	71-43-2	Benzene
Benzo[a]anthracene; Benzanthracene	56-55-3	Benz[a]anthracene
Benzo[b]fluoranthene	205-99-2	Benz[e]acephenanthrylene
Benzo[k]fluoranthene	207-08-9	Benzo[k]fluoranthene
Benzo[ghi]perylene	191-24-2	Benzo[ghi]perylene
Benzo[a]pyrene	50-32-8	Benzo[a]pyrene
Benzyl alcohol	100-51-6	Benzenemethanol
Beryllium		Beryllium
alpha-BHC	319-84-6	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1 α ,2 α ,3 β ,4 α ,5 β ,6 β)-
beta-BHC	319-85-7	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1 α ,2 β ,3 α ,4 β ,5 α ,6 β)-
delta-BHC	319-86-8	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1 α ,2 α ,3 α ,4 β ,5 α ,6 β)-
gamma-BHC; Lindane	58-89-9	Cyclohexane, 1,2,3,4,5,6- hexachloro-, (1 α ,2 α , 3 β , 4 α ,5 α ,6 β)-
Bis(2-chloroethoxy)methane	111-91-1	Ethane, 1,1'-[methylenebis (oxy)]bis [2-chloro-
Bis(2-chloroethyl)ether; Dichloroethyl ether	111-44-4	Ethane, 1,1'-oxybis[2-chloro-

Common name ¹	CAS RN ²	Chemical abstracts service index name ³
Bis(2-chloro-1-methylethyl) ether; 2,2'-Dichlorodiisopropyl ether; DCIP, See footnote 4	108-60-1	Propane, 2,2'-oxybis[1-chloro-
Bis(2-ethylhexyl) phthalate	117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl)ester
Bromochloromethane; Chlorobromomethane	74-97-5	Methane, bromochloro-
Bromodichloromethane; Dibromochloromethane	75-27-4	Methane, bromodichloro-
Bromoform; Tribromomethane	75-25-2	Methane, tribromo-
4-Bromophenyl phenyl ether	101-55-3	Benzene, 1-bromo-4-phenoxy-
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester
Cadmium		Cadmium
Carbon disulfide	75-15-0	Carbon disulfide
Carbon tetrachloride	56-23-5	Methane, tetrachloro-
Chlordane	See footnote 5	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-
p-Chloroaniline	106-47-8	Benzenamine, 4-chloro-
Chlorobenzene	108-90-7	Benzene, chloro-
Chlorobenzilate	510-15-6	Benzeneacetic acid, 4-chloro-(4-chlorophenyl)-hydroxy-, ethyl ester.
p-Chloro-m-cresol; 4-Chloro-3-methylphenol	59-50-7	Phenol, 4-chloro-3-methyl-
Chloroethane; Ethyl chloride	75-00-3	Ethane, chloro-
Chloroform; Trichloromethane	67-66-3	Methane, trichloro-
2-Chloronaphthalene	91-58-7	Naphthalene, 2-chloro-
2-Chlorophenol	95-57-8	Phenol, 2-chloro-
4-Chlorophenyl phenyl ether	7005-72-3	Benzene, 1-chloro-4-phenoxy-
Chloroprene	126-99-8	1,3-Butadiene, 2-chloro-
Chromium		Chromium

Common name ¹	CAS RN ²	Chemical abstracts service index name ³
Chrysene	218-01-9	Chrysene
Cobalt		Cobalt
Copper		Copper
m-Cresol; 3-Methylphenol	108-39-4	Phenol, 3-methyl-
o-Cresol; 2-Methylphenol	95-48-7	Phenol, 2-methyl-
p-Cresol; 4-Methylphenol	106-44-5	Phenol, 4-methyl-
Cyanide	57-12-5	Cyanide
2,4-D; 2,4-Dichlorophenoxyacetic acid	94-75-7	Acetic acid, (2,4-dichlorophenoxy)-
4,4'-DDD	72-54-8	Benzene 1,1'-(2,2-dichloroethylidene) bis[4-chloro-
4,4'-DDE	72-55-9	Benzene, 1,1'-(dichloroethenylidene) bis[4-chloro-
4,4'-DDT	50-29-3	Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-chloro-
Diallate	2303-16-4	Carbamothioic acid, bis(1-methylethyl)-, S- (2,3-dichloro-2-propenyl) ester.
Dibenz[a,h]anthracene	53-70-3	Dibenz[a,h]anthracene
Dibenzofuran	132-64-9	Dibenzofuran
Dibromochloromethane; Chlorodibromomethane	124-48-1	Methane, dibromochloro-
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	Propane, 1,2-dibromo-3-chloro-
1,2-Dibromoethane; Ethylene dibromide; EDB	106-93-4	Ethane, 1,2-dibromo-
Di-n-butyl phthalate	84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester
o-Dichlorobenzene; 1,2-Dichlorobenzene	95-50-1	Benzene, 1,2-dichloro-
m-Dichlorobenzene; 1,3-Dichlorobenzene	541-73-1	Benzene, 1,3-dichloro-

Common name ¹	CAS RN ²	Chemical abstracts service index name ³
p-Dichlorobenzene; 1,4-Dichlorobenzene	106-46-7	Benzene, 1,4-dichloro-
3,3'-Dichlorobenzidine	91-94-1	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-
trans-1,4-Dichloro-2-butene	110-57-6	2-Butene, 1,4-dichloro-, (E)-
Dichlorodifluoromethane; CFC 12	75-71-8	Methane, dichlorodifluoro-
1,1-Dichloroethane; Ethyldidene chloride	75-34-3	Ethane, 1,1-dichloro-
1,2-Dichloroethane; Ethylene dichloride	107-06-2	Ethane, 1,2-dichloro-
1,1-Dichloroethylene; 1,1-Dichloroethene;	75-35-4	Ethene, 1,1-dichloro-
Vinylidene chloride cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2	Ethene, 1,2-dichloro-(Z)-
trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene	156-60-5	Ethene, 1,2-dichloro-, (E)-
2,4-Dichlorophenol	120-83-2	Phenol, 2,4-dichloro-
2,6-Dichlorophenol	87-65-0	Phenol, 2,6-dichloro-
1,2-Dichloropropane	78-87-5	Propane, 1,2-dichloro-
1,3-Dichloropropane; Trimethylene dichloride	142-28-9	Propane, 1,3-dichloro-
2,2-Dichloropropane; Isopropylidene chloride	594-20-7	Propane, 2,2-dichloro-
1,1-Dichloropropene	563-58-6	1-Propene, 1,1-dichloro-
cis-1,3-Dichloropropene	10061-01-5	1-Propene, 1,3-dichloro-, (Z)-
trans-1,3-Dichloropropene	10061-02-6	1-Propene, 1,3-dichloro-, (E)-
Dieldrin	60-57-1	2,7:3,6-Dimethanonaphth [2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1 α ,2 β ,2 α ,3 β ,6 β ,6 α ,7 β ,7 α)-

Common name ¹	CAS RN ²	Chemical abstracts service index name ³
Diethyl phthalate	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester
O,O-Diethyl O-2-pyrazinyl phosphorothioate; Thionazin	297-97-2	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester.
Dimethoate	60-51-5	Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester
p-(Dimethylamino)azobenzene	60-11-7	Benzenamine, N,N-dimethyl-4-(phenylazo)-
7,12-Dimethylbenz[a]anthracene	57-97-6	Benz[a]anthracene, 7,12-dimethyl-
3,3'-Dimethylbenzidine	119-93-7	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-
alpha, alpha-Dimethylphenethylamine	122-09-8	Benzeneethanamine, α,α -dimethyl-
2,4-Dimethylphenol; m-Xylenol	105-67-9	Phenol, 2,4-dimethyl-
Dimethyl phthalate	131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester
m-Dinitrobenzene	99-65-0	Benzene, 1,3-dinitro-
4,6-Dinitro-o-cresol; 4,6-Dinitro-2-methylphenol	534-52-1	Phenol, 2-methyl-4,6-dinitro-
2,4-Dinitrophenol	51-28-5	Phenol, 2,4-dinitro-
2,4-Dinitrotoluene	121-14-2	Benzene, 1-methyl-2,4-dinitro-
2,6-Dinitrotoluene	606-20-2	Benzene, 2-methyl-1,3-dinitro-
Dinoseb; DNBP; 2-sec-Butyl-4,6-dinitrophenol	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-
Di-n-octyl phthalate	117-84-0	1,2-Benzenedicarboxylic acid, dioctyl ester
Diphenylamine	122-39-4	Benzenamine, N-phenyl-
Disulfoton	298-04-4	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester
Endosulfan I	959-98-8	6,9-Methano-2,4,3-benzodiox-athiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide,

Common name ¹	CAS RN ²	Chemical abstracts service index name ³
Endosulfan II	33213-65-9	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide, (3 α ,5 α ,6 β ,9 β , 9 α)-
Endosulfan sulfate	1031-07-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3,3-dioxide
Endrin	72-20-8	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1 α , 2 β ,2 α β , 3 α ,6 α ,6 α β ,7 β ,7 α)-
Endrin aldehyde	7421-93-4	1,2,4-Methenocyclopenta[cd]pentalene-5-carboxaldehyde,2,2a,3,3,4,7-hexachlorodecahydro-(1 α ,2 β ,2 α β ,4 β ,4 α β ,5 β ,6 α β ,6 β β ,7R*)-
Ethylbenzene	100-41-4	Benzene, ethyl-
Ethyl methacrylate	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester
Ethyl methanesulfonate	62-50-0	Methanesulfonic acid, ethyl ester
Famphur	52-85-7	Phosphorothioic acid, O-[4-[(dimethylamino)sulfonyl]phenyl]-O,O-dimethyl ester
Fluoranthene	206-44-0	Fluoranthene
Fluorene	86-73-7	9H-Fluorene
Heptachlor	76-44-8	4,7-Methano-1H-indene,1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-
Heptachlor epoxide	1024-57-3	2,5-Methano-2H-indeno[1,2-b]oxirene, 2,3,4,5,6,7,7-heptachloro-1a,1b,5,5a,6,6a,-hexahydro-,(1 α ,1 β ,2 α ,5 α ,5 α β ,6 β ,6 α)
Hexachlorobenzene	118-74-1	Benzene, hexachloro-
Hexachlorobutadiene	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-
Hexachlorocyclopentadiene	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-
Hexachloroethane	67-72-1	Ethane, hexachloro-

Common name ¹	CAS RN ²	Chemical abstracts service index name ³
Hexachloropropene	1888-71-7	1-Propene, 1,1,2,3,3,3-hexachloro-
2-Hexanone; Methyl butyl ketone	591-78-6	2-Hexanone
Indeno(1,2,3-cd)pyrene	193-39-5	Indeno[1,2,3-cd]pyrene
Isobutyl alcohol	78-83-1	1-Propanol, 2-methyl-
Isodrin	465-73-6	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a hexahydro-(1 α , 4 α , 4a β ,5 β ,8 β ,8a β)-
Isophorone	78-59-1	2-Cyclohexen-1-one, 3,5,5-trimethyl-
Isosafrole	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-
Kepone	143-50-0	1,3,4-Metheno-2H-cyclobuta-[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-
Lead		Lead
Mercury		Mercury
Methacrylonitrile	126-98-7	2-Propenenitrile, 2-methyl-
Methapyrilene	91-80-5	1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-
Methoxychlor	72-43-5	Benzene, 1,1'-(2,2,2, trichloroethylidene)bis [4-methoxy-
Methyl bromide; Bromomethane	74-83-9	Methane, bromo-
Methyl chloride; Chloromethane	74-87-3	Methane, chloro-
3-Methylcholanthrene	56-49-5	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-
Methyl ethyl ketone; MEK; 2-Butanone	78-93-3	2-Butanone
Methyl iodide; Iodomethane	74-88-4	Methane, iodo-
Methyl methacrylate	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester

Common name ¹	CAS RN ²	Chemical abstracts service index name ³
Methyl methanesulfonate	66-27-3	Methanesulfonic acid, methyl ester
2-Methylnaphthalene	91-57-6	Naphthalene, 2-methyl-
Methyl parathion; Parathion methyl	298-00-0	Phosphorothioic acid, O,O-dimethyl
4-Methyl-2-pentanone; Methyl isobutyl ketone	108-10-1	2-Pentanone, 4-methyl-
Methylene bromide; Dibromomethane	74-95-3	Methane, dibromo-
Methylene chloride; Dichloromethane	75-09-2	Methane, dichloro-
Naphthalene	91-20-3	Naphthalene
1,4-Naphthoquinone	130-15-4	1,4-Naphthalenedione
1-Naphthylamine	134-32-7	1-Naphthalenamine
2-Naphthylamine	91-59-8	2-Naphthalenamine
Nickel		Nickel
o-Nitroaniline; 2-Nitroaniline	88-74-4	Benzenamine, 2-nitro-
m-Nitroaniline; 3-Nitroaniline	99-09-2	Benzenamine, 3-nitro-
p-Nitroaniline; 4-Nitroaniline	100-01-6	Benzenamine, 4-nitro-
Nitrobenzene	98-95-3	Benzene, nitro-
o-Nitrophenol; 2-Nitrophenol	88-75-5	Phenol, 2-nitro-
p-Nitrophenol; 4-Nitrophenol	100-02-7	Phenol, 4-nitro-
N-Nitrosodi-n-butylamine	924-16-3	1-Butanamine, N-butyl-N-nitroso-
N-Nitrosodiethylamine	55-18-5	Ethanamine, N-ethyl-N-nitroso-
N-Nitrosodimethylamine	62-75-9	Methanamine, N-methyl-N-nitroso-
N-Nitrosodiphenylamine	86-30-6	Benzenamine, N-nitroso-N-phenyl-
N-Nitrosodipropylamine; N-Nitroso-N-dipropylamine; Di-n-propylnitrosamine	621-64-7	1-Propanamine, N-nitroso-N-propyl-
N-Nitrosomethylethalamine	10595-95-6	Ethanamine, N-methyl-N-nitroso-
N-Nitrosopiperidine	100-75-4	Piperidine, 1-nitroso-
N-Nitrosopyrrolidine	930-55-2	Pyrrolidine, 1-nitroso-

Common name ¹	CAS RN ²	Chemical abstracts service index name ³
5-Nitro-o-toluidine	99-55-8	Benzenamine, 2-methyl-5-nitro-
Parathion	56-38-2	Phosphorothioic acid, O,O-diethyl-O-(4-nitrophenyl) ester
Pentachlorobenzene	608-93-5	Benzene, pentachloro-
Pentachloronitrobenzene	82-68-8	Benzene, pentachloronitro-
Pentachlorophenol	87-86-5	Phenol, pentachloro-
Phenacetin	62-44-2	Acetamide, N-(4-ethoxyphenyl)
Phenanthrene	85-01-8	Phenanthrene
Phenol	108-95-2	Phenol
p-Phenylenediamine	106-50-3	1,4-Benzenediamine
Phorate	298-02-2	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester
Polychlorinated biphenyls; PCBs	See footnote 6	1,1'-Biphenyl, chloro derivatives
Pronamide	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-
Propionitrile; Ethyl cyanide	107-12-0	Propanenitrile
Pyrene	129-00-0	Pyrene
Safrole	94-59-7	1,3-Benzodioxole, 5-(2-propenyl)-
Selenium		Selenium
Silver		Silver
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-
Styrene	100-42-5	Benzene, ethenyl-
Sulfide	18496-25-8	Sulfide
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid	93-76-5	Acetic acid, (2,4,5-trichlorophenoxy)-
2,3,7,8-TCDD; 2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	Dibenzo[b,e][1,4]dioxin, 2,3,7,8-tetrachloro-
1,2,4,5-Tetrachlorobenzene	95-94-3	Benzene, 1,2,4,5-tetrachloro-
1,1,1,2-Tetrachloroethane	630-20-6	Ethane, 1,1,1,2-tetrachloro-

Common name ¹	CAS RN ²	Chemical abstracts service index name ³
1,1,2,2-Tetrachloroethane	79-34-5	Ethane, 1,1,2,2-tetrachloro-
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	127-18-4	Ethene, tetrachloro-
2,3,4,6-Tetrachlorophenol	58-90-2	Phenol, 2,3,4,6-tetrachloro-
Thallium		Thallium
Tin		Tin
Toluene	108-88-3	Benzene, methyl-
o-Toluidine	95-53-4	Benzenamine, 2-methyl-
Toxaphene	See footnote 7	Toxaphene
1,2,4-Trichlorobenzene	120-82-1	Benzene, 1,2,4-trichloro-
1,1,1-Trichloroethane; Methylchloroform	71-55-6	Ethane, 1,1,1-trichloro-
1,1,2-Trichloroethane	79-00-5	Ethane, 1,1,2-trichloro-
Trichloroethylene; Trichloroethene	79-01-6	Ethene, trichloro-
Trichlorofluoromethane; CFC- 11	75-69-4	Methane, trichlorofluoro-
2,4,5-Trichlorophenol	95-95-4	Phenol, 2,4,5-trichloro-
2,4,6-Trichlorophenol	88-06-2	Phenol, 2,4,6-trichloro-
1,2,3-Trichloropropane	96-18-4	Propane, 1,2,3-trichloro-
O,O,O-Triethyl phosphorothioate	126-68-1	Phosphorothioic acid, O,O,O-triethyl ester
sym-Trinitrobenzene	99-35-4	Benzene, 1,3,5-trinitro-
Vanadium		Vanadium
Vinyl acetate	108-05-4	Acetic acid, ethenyl ester
Vinyl chloride; Chloroethene	75-01-4	Ethene, chloro-
Xylene (total)	See footnote 8	Benzene, dimethyl-
Zinc		Zinc

¹Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

²Chemical Abstracts Service registry number.

³CAS index names are those used in the 9th Cumulative Index.

⁴This substance is often called bis(2-chloroisopropyl) ether, the name Chemical Abstracts Service applies to its noncommercial isomer, propane, 2,2"-oxybis[2-chloro-(CAS RN 39638-32-9).

⁵Chlordane: This entry includes alpha-chlordane (CAS RN 5103-71-9), beta-chlordane (CAS RN 5103-74-2), gamma-chlordane (CAS RN 5566-34-7), and constituents of chlordane (CAS RN 57-74-9 and CAS RN 12789-03-6).

⁶Polychlorinated biphenyls (CAS RN 1336-36-3); this category contains congener chemicals, including constituents of Aroclor-1016 (CAS RN 12674-11-2), Aroclor-1221 (CAS RN 11104-28-2), Aroclor-1232 (CAS RN 11141-16-5), Aroclor-1242 (CAS RN 53469-21-9), Aroclor-1248 (CAS RN 12672-29-6), Aroclor-1254 (CAS RN 11097-69-1), and Aroclor-1260 (CAS RN 11096-82-5).

⁷Toxaphene: This entry includes congener chemicals contained in technical toxaphene (CAS RN 8001-35-2), i.e., chlorinated camphene.

⁸Xylene (total): This entry includes o-xylene (CAS RN 96-47-6), m-xylene (CAS RN 108-38-3), p-xylene (CAS RN 106-42-3), and unspecified xylenes (dimethylbenzenes) (CAS RN 1330-20-7).

(History: 75-10-204, MCA; IMP, 75-10-204, 75-10-207, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

17.50.1308 ASSESSMENT OF CORRECTIVE MEASURES (1) Within 90 days after a determination is made pursuant to ARM 17.50.1307 that a constituent listed in Appendix II to 40 CFR Part 258 (July 1, 2008) has been detected at a statistically significant level exceeding the ground water protection standards defined under ARM 17.50.1307(8), the owner or operator of a facility shall:

- (a) initiate an assessment of corrective measures; and
- (b) submit to the department for approval an assessment of corrective measures that addresses the criteria listed in (3).

(2) The owner or operator shall continue to monitor in accordance with the assessment monitoring program as specified in ARM 17.50.1307.

(3) The assessment in (1) must include an analysis of the effectiveness of potential corrective measures in meeting all of the requirements and objectives of the remedy as described under ARM 17.50.1309, addressing at least the following:

- (a) the performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;
- (b) the time required to begin and complete the remedy;
- (c) the costs of remedy implementation; and
- (d) the institutional requirements such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(s).

(4) Prior to the selection of a remedy, the owner or operator shall discuss the results of the corrective measures assessment in a public meeting with interested and affected parties. (History: 75-10-204, MCA; IMP, 75-10-204, 75-10-207, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

17.50.1309 SELECTION OF REMEDY (1) Based on the results of a corrective measures assessment conducted under ARM 17.50.1308, the owner or operator of a facility shall:

- (a) select a remedy that, at a minimum, meets the standards listed in (2);
- (b) submit to the department for approval, within 90 days after the date of the department's approval of the assessment of corrective measures required in ARM 17.50.1308(1), a selected remedy report describing how the selected remedy would meet the standards in (2) through (4), and how it would be implemented;
- (c) submit design plans for the selected remedy, and construction quality control (CQC) and construction quality assurance (CQA) plans to the same extent required in ARM 17.50.1205; and
- (d) notify the department, within 14 days after obtaining department approval of the selected remedy report, that the selected remedy report, design plans, and CQC and CQA plans have been placed in the operating record.

(2) Remedies in (1) must satisfy the following:

(a) be protective of human health and the environment;

(b) attain the ground water protection standard as specified pursuant to ARM 17.50.1307(8) or (9);

(c) control the source(s) of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of a constituent in Appendix II to 40 CFR Part 258 (July 1, 2008) into the environment that may pose a threat to human health or the environment; and

(d) comply with standards for management of wastes as specified in ARM 17.50.1310(4).

(3) In selecting a remedy that meets the standards of (2), the owner or operator shall consider the following evaluation factors:

(a) the long- and short-term effectiveness and protectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful, based on consideration of the following:

(i) magnitude of reduction of existing risks;

(ii) magnitude of residual risks in terms of likelihood of further releases due to waste remaining following implementation of a remedy;

(iii) the type and degree of long-term management required, including monitoring, operation, and maintenance;

(iv) short-term risks that might be posed to the community, workers, or the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and redisposal or containment;

(v) time until full protection is achieved;

(vi) potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, redisposal, or containment;

(vii) long-term reliability of the engineering and institutional controls; and

(viii) potential need for replacement of the remedy;

(b) the effectiveness of the remedy in controlling the source to reduce further releases, based on consideration of the following factors:

(i) the extent to which containment practices will reduce further releases; and

(ii) the extent to which treatment technologies may be used;

(c) the ease or difficulty of implementing a potential remedy(s), based on consideration of the following factors:

(i) degree of difficulty associated with constructing the technology;

(ii) expected operational reliability of the technologies;

(iii) need to coordinate with and obtain necessary approvals and permits from other agencies;

(iv) availability of necessary equipment and specialists; and

(v) available capacity and location of needed treatment, storage, and disposal services;

(d) practicable capability of the owner or operator, including consideration of technical and economic capability; and

(e) the degree to which community concerns are addressed by a potential remedy(s).

(4) An owner or operator required by (1) to select a remedy shall specify as part of the selected remedy a schedule(s) for initiating and completing remedial activities. Such a schedule must require the initiation of remedial activities within a reasonable period of time, taking into consideration the factors in (4)(a) through (f). The owner or operator shall consider the following factors in determining the schedule of remedial activities:

- (a) extent and nature of contamination;
- (b) practical capabilities of remedial technologies in achieving compliance with ground water protection standards established under ARM 17.50.1307(8) or (9) and other objectives of the remedy;
- (c) availability of treatment or disposal capacity for wastes managed during implementation of the remedy;
- (d) desirability of utilizing technologies that are not currently available, but that may offer significant advantages over already available technologies in terms of effectiveness, reliability, safety, or ability to achieve remedial objectives;
- (e) potential risks to human health and the environment from exposure to contamination prior to completion of the remedy; and
- (f) resource value of the aquifer, including:
 - (i) current and future uses;
 - (ii) proximity and withdrawal rate of users;
 - (iii) ground water quantity and quality;
 - (iv) the potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;
 - (v) the hydrogeologic characteristic of the facility and surrounding land;
 - (vi) ground water removal and treatment costs;
 - (vii) the cost and availability of alternative water supplies; and
 - (viii) the practicable capability of the owner or operator.

(5) The department may determine that remediation of a release of a constituent in Appendix II to 40 CFR Part 258 (July 1, 2008) from a Class II or Class IV landfill unit is not necessary if the unit's owner or operator demonstrates to the satisfaction of the department that:

- (a) the ground water is additionally contaminated by substances that have originated from a source other than the unit and those substances are present in concentrations such that cleanup of the release from the unit would provide no significant reduction in risk to actual or potential receptors; or
- (b) the constituent(s) is present in ground water that:
 - (i) is not currently, or reasonably expected to be, a source of drinking water; and
 - (ii) is not hydraulically connected with waters to which the constituent is migrating or is likely to migrate in a concentration(s) that would exceed the ground water protection standards established under ARM 17.50.1307;
- (c) remediation of the release(s) is technically impracticable; or
- (d) remediation results in unacceptable cross-media impacts.

(6) A determination by the department pursuant to (5) does not affect the authority of the department to require the owner or operator to undertake source control measures or other measures that may be necessary to eliminate or minimize further releases to the ground water, to prevent exposure to the ground water, or to remediate the ground water to concentrations that are technically practicable and significantly reduce threats to human health or the environment. (History: 75-10-204, MCA; IMP, 75-10-204, 75-10-207, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

17.50.1310 IMPLEMENTATION OF THE CORRECTIVE ACTION

PROGRAM (1) Based on the schedule established under ARM 17.50.1309(4) for initiation and completion of remedial activities, an owner or operator required by ARM 17.50.1309 to select a remedy shall:

(a) submit for department approval, and if approved, establish and implement, a corrective action ground water monitoring program that:

(i) at a minimum, meets the requirements of an assessment monitoring program under ARM 17.50.1307;

(ii) indicates the effectiveness of the corrective action remedy; and

(iii) demonstrates compliance with the ground water protection standard pursuant to (5);

(b) implement the corrective action remedy selected under ARM 17.50.1309; and

(c) submit for department approval, and if approved, take any interim measures necessary to ensure the protection of human health and the environment. Interim measures must, to the greatest extent practicable, be consistent with the objectives of, and contribute to the performance of, any remedy that may be required pursuant to ARM 17.50.1309. The following factors must be considered by an owner or operator and the department in determining whether interim measures are necessary:

(i) time required to develop and implement a final remedy;

(ii) actual or potential exposure of nearby populations or environmental receptors to constituents in Appendix II to 40 CFR Part 258 (July 1, 2008);

(iii) actual or potential contamination of drinking water supplies or sensitive ecosystems;

(iv) further degradation of the ground water that may occur if remedial action is not initiated expeditiously;

(v) weather conditions that may cause constituents to migrate or be released;

(vi) risks of fire or explosion, or potential for exposure to constituents as a result of an accident or failure of a container or handling system; and

(vii) other situations that may pose threats to human health and the environment.

(2) An owner or operator of a facility may determine, based on information developed after implementation of the remedy has begun or other information, that compliance with requirements of ARM 17.50.1309(2) is not being achieved through the remedy selected. In such cases, the owner or operator shall implement other methods or techniques that:

(a) are developed by following the procedures in ARM 17.50.1309(1) through (4); and

(b) could practicably achieve compliance with the requirements, unless the owner or operator makes the determination under (3).

(3) If the owner or operator submits for department approval a determination that compliance with requirements under ARM 17.50.1309(2) cannot be practically achieved with any currently available methods, the owner or operator shall, within 60 days after obtaining department approval:

(a) submit a certification of a qualified ground water scientist for department approval that compliance with requirements under ARM 17.50.1309(2) cannot be practically achieved with any currently available methods;

(b) implement alternate measures to control exposure of humans or the environment to residual contamination, as necessary to protect human health and the environment;

(c) implement alternate measures for control of the sources of contamination, or for removal or decontamination of equipment, units, devices, or structures that are:

(i) technically practicable; and

(ii) consistent with the overall objective of the remedy;

(d) submit for department approval a report justifying the alternative measures selected pursuant to (3)(b) and (c); and

(e) notify the department within 14 days after obtaining department approval that the report justifying the alternative measures in (3)(d) has been placed in the operating record.

(4) All solid wastes managed pursuant to a remedy required under ARM 17.50.1309, or an interim measure required under (1)(c), must be managed in a manner that:

(a) is protective of human health and the environment; and

(b) complies with applicable RCRA requirements.

(5) A remedy selected pursuant to ARM 17.50.1309 is complete when:

(a) the owner or operator complies with the ground water protection standards established under ARM 17.50.1307 at all points within the plume of contamination that lie beyond the ground water monitoring well system established under ARM 17.50.1304(1);

(b) compliance with the ground water protection standards established under ARM 17.50.1307 has been achieved by demonstrating, using the statistical procedures and performance standards in ARM 17.50.1305(7) and (8), that concentrations of constituents in Appendix II to 40 CFR Part 258 (July 1, 2008) have not exceeded the ground water protection standards for a period of three consecutive years; and

(c) all actions required to remediate the release have been completed.

(6) The department may specify an alternative to the period in (5)(b) after taking into consideration:

- (a) extent and concentration of the release(s);
- (b) behavior characteristics of the constituents in the ground water;
- (c) accuracy of monitoring or modeling techniques, including any seasonal, meteorological, or other environmental variabilities that may affect accuracy; and
- (d) characteristics of the ground water.

(7) Within 14 days after completion of the remedy specified in (5), the owner or operator shall submit to the department for approval a certification that the remedy has been completed in compliance with the requirements of (5), and (6) if applicable, and place the certification in the operating record. The certification must be signed by the owner or operator and by a qualified ground water scientist.

(8) When the certification required in (7) is approved by the department, the owner or operator must be released from the requirements for financial assurance for corrective action under ARM 17.50.540. (History: 75-10-204, MCA; IMP, 75-10-204, 75-10-207, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

17.50.1311 HYDROGEOLOGIC AND SOILS CHARACTERIZATION

(1) The owner or operator of a facility required to monitor ground water shall prepare a site-specific hydrogeologic and soils report, pursuant to (2), for the facility. The following criteria and exceptions also apply:

- (a) The owner or operator of a Class IV landfill unit located within the ground water monitoring network of a licensed Class II landfill is not required to submit a hydrogeologic and soils report;
- (b) The owner or operator of an existing facility or lateral expansion required to monitor ground water under this rule shall submit to the department for approval a hydrogeologic and soils work plan that describes the proposed sampling, analysis, and collection methods for the data required in (2), within the following time frames:
 - (i) draft work plan(s) must be submitted within 90 days after the department mails a notification to applicant that a hydrogeologic and soils report is required;
 - (ii) revised work plan(s) must be submitted within 30 days after the department comments are mailed to the applicant; and
 - (iii) final hydrogeologic and soils reports must be submitted within 180 days after the department's approval of the work plan is mailed by the department to the applicant.

(2) A hydrogeologic and soils report required in (1) must include the following:

(a) descriptions of the regional and facility specific geologic and hydrogeologic characteristics affecting ground water flow beneath the facility, including:

- (i) regional and facility specific stratigraphy;
- (ii) structural geology;
- (iii) ground water potentiometric maps;
- (iv) a discussion of any regional deep aquifers;
- (v) regional and facility specific ground water flow patterns;
- (vi) characterization of seasonal variations in the ground water flow regime;

and

(vii) identification and description of the confining layers present, both above and below the saturated zone(s);

(b) an analysis of any topographic features that influence the ground water flow;

(c) a description of the hydrogeologic units that overlie the uppermost aquifer, or underground drinking water source, as required in ARM 17.50.1204, or that may be part of the leachate migration pathways at the facility, including saturated and unsaturated units;

(d) a description of hydrogeologically significant sand and gravel layers in unconsolidated deposits;

(e) a description of manmade structures that affect the hydrogeology of the site, such as:

- (i) local water supply wells;
- (ii) pipelines;
- (iii) drains;
- (iv) ditches; and
- (v) septic tanks;

(f) for each ground water monitoring well at the facility, the following information:

- (i) location;
- (ii) elevation;
- (iii) well log;
- (iv) sampling history; and
- (v) operational history; and

(g) any other information determined by the department to be necessary to adequately characterize the hydrogeologic characteristics of the solid waste landfill facility.

(3) If soil borings are necessary to obtain the information required in (2), the soil borings must be conducted as follows:

- (a) all borings must be within 300 feet of the limits of waste filling, if practical;
- (b) borings must extend a minimum of 20 feet below the base of waste disposal areas, or to bedrock, whichever is less;
- (c) the minimum required number of borings is as follows:
 - (i) 0-10 acres..... 15 borings;
 - (ii) 11-20 acres..... add one boring per additional acre;
 - (iii) 20-40 acres..... add one boring per additional two acres; and
 - (iv) 41 or more acres..... add one boring per additional four acres;
- (d) 75% of the required number of borings may be conducted with a backhoe to a depth of ten feet; and
- (e) borings not converted to wells must be abandoned pursuant to ARM 17.50.1312. (History: 75-10-204, MCA; IMP, 75-10-204, 75-10-207, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

17.50.1312 MONITORING WELL ABANDONMENT (1) The owner or operator of a solid waste management facility shall:

- (a) completely seal all abandoned borings, water supply wells, and monitoring wells with grout or bentonite to prevent future contamination of ground water. The sealing materials must be continuous, physically and chemically stable, and have a hydraulic conductivity of less than 1×10^{-5} cm/sec;
- (b) immediately abandon, after drilling and completion of soil testing, all boreholes not completed as a monitoring well, piezometer, or water supply well;
- (c) for any borehole deeper than the well to be placed in it, seal with bentonite pellets or a bentonite slurry the portions of the borehole below the well screen; and
- (d) conduct all abandonment activities in accordance with ARM 36.21.670 through 36.21.678 and 36.21.810. (History: 75-10-204, MCA; IMP, 75-10-204, MCA; NEW, 2010 MAR p. 317, Eff. 2/12/10.)

