NEBRASKA ADMINISTRATIVE CODE

Title 132 - NEBRASKA DEPARTMENT OF ENVIRONMENTAL QUALITY

Chapter 7 - GROUND WATER MONITORING AND REMEDIAL ACTION

001 Applicability.

001.01 Except as provided in 001.02 of this chapter, the requirements of this chapter apply to all solid waste disposal areas accepting municipal solid waste, industrial waste, delisted waste and fossil fuel combustion ash.

001.02 The Director may suspend the ground water monitoring requirements of sections 002 through 005 of this chapter if the owner or operator of a solid waste disposal area can demonstrate that there is no potential for migration of hazardous constituents from that disposal area to the uppermost aquifer during its active life and the post-closure period.

001.02A This demonstration shall be certified by a qualified ground water scientist and approved by the Department, and based upon the following:

001.02A1 Site-specific field collected measurements, sampling, and analysis of physical, chemical, and biological processes affecting contaminant fate and transport; and

001.02A2 Contaminant fate and transport predictions that maximize contaminant migration and consider impacts on human health and the environment.

001.03 Once established, ground water monitoring shall be conducted throughout the active life and post-closure care period of the solid waste disposal area as specified in these regulations.

001.04 For purposes of this chapter, “qualified ground water scientist” shall mean a scientist or an engineer who has received a baccalaureate or post-graduate degree in the physical sciences or engineering and has sufficient training and experience in ground water hydrology and related fields as 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 remedial action.

002 Ground Water Monitoring Systems.

002.01 An owner or operator 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 that:

002.01A Represent the quality of background ground water that has not been affected by leakage from an existing solid waste disposal area. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the solid waste disposal area where:

002.01A1 Hydrogeologic conditions do not allow the owner or operator to determine what wells are hydraulically upgradient; or

002.01A2 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

002.01B Represent the quality of the ground water passing the relevant point of compliance specified by the Department under 003.04D of Chapter 3 and 003.04D of Chapter 4.

002.01B1 The downgradient monitoring systems shall be installed at the relevant point of compliance specified by the Department under these regulations that ensures detection of ground water contamination in the uppermost aquifer.

002.01B2 When physical obstacles preclude installation of ground water monitoring wells at the relevant point of compliance at existing units, the downgradient monitoring systems may be installed at the closest practicable distance hydraulically downgradient from the relevant point of compliance specified by the Department under these regulations that ensures detection of ground water contamination in the uppermost aquifer.

002.02 A multi-unit ground water monitoring system (rather than separate ground water monitoring systems for each landfill unit) may be approved when the facility has several units, provided the multi-unit ground water monitoring system:

002.02A Meets the requirements of 002.01 of this chapter; and

002.02B Will be as protective of human health and the environment as individual ground water monitoring systems for each solid waste disposal area, based on the following factors:

002.02B1 Number, spacing, and orientation of the solid waste disposal area units;

002.02B2 Hydrogeologic setting;

002.02B3 Site history;

002.02B4 Engineering design of the solid waste disposal area;

002.02B5 Type of waste accepted at the solid waste disposal area.

002.03 Ground water monitoring wells shall be cased in a manner that maintains the integrity of the monitoring well bore hole.

002.03A This casing shall be screened or perforated and packed with sand or gravel, where necessary, to enable collection of ground water samples.

002.03B The annular space (i.e., the space between the bore hole and well casing) above the sampling depth shall be sealed to prevent contamination of samples and the ground water.

002.03C An owner or operator shall notify the Department that the design, installation, development, and decommission of any monitoring wells, piezometers and any other measurement, sampling, and analytical devices documentation has been placed in the operating record.

002.03D The monitoring wells, piezometers, and other measurement, sampling, and analytical devices shall be operated and maintained so that they perform to design specifications throughout the life of the monitoring program.

002.04 The number, spacing, and depths of the monitoring systems shall be:

002.04A Determined based upon site-specific technical information that shall include thorough characterization of:

002.04A1 Aquifer thickness, ground water flow rate, ground water flow direction including seasonal and temporal fluctuations in ground water flow; and

002.04A2 Saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining unit defining the lower boundary of the uppermost aquifer, including but not limited to:

002.04A2(a) Thickness, stratigraphy, lithology, hydraulic conductivities, porosities and effective porosities.

002.04B Certified by a qualified ground water scientist and approved by Department.

002.04B1 An owner or operator shall notify the Department that this certification has been placed in the record within fourteen (14) days of the certification.

003 Ground Water Sampling and Analysis Requirements.

003.01 The ground water monitoring plan shall include 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 002 of this chapter.

003.01A An owner or operator shall notify the Department that the sampling and analysis plan has been placed in the operating record.

003.01B The plan shall include procedures and techniques for:

003.01B1 Sample collection;

003.01B2 Sample preservation and shipment;

003.01B3 Analytical procedures;

003.01B4 Chain of custody control; and

003.01B5 Quality assurance and quality control.

003.02 The ground water monitoring plan shall include sampling and analytical methods that are appropriate for ground water sampling and that accurately measure hazardous constituents and other monitoring parameters in ground water samples.

003.03 The sampling procedures and frequency shall be protective of human health and the environment.

003.04 Each time ground water is sampled, ground water elevations shall be measured in each well immediately prior to purging.

003.04A An owner or operator shall determine the rate and direction of ground water flow each time ground water is sampled.

003.04B Ground water elevations in wells which monitor the same solid waste disposal area must be measured within a period of time short enough to avoid temporal variations in ground water flow which could preclude accurate determination of ground water flow rate and direction.

003.05 An owner or operator shall establish background ground water quality in a hydraulically upgradient or background well(s) for each of the monitoring parameters of constituents required in the particular ground water monitoring program that applies to the solid waste disposal area, as determined by 004.01 or 005.01 of this chapter.

003.05A Background ground water quality may be established at wells that are not located hydraulically upgradient from the solid waste disposal area if they meet the requirements of 002.01A of this chapter.

003.06 The number of samples collected to establish ground water quality data shall be consistent with the appropriate statistical procedures determined pursuant to 003.07 of this chapter.

003.06A The sampling procedures shall be those specified under 004.02 of this chapter for detection monitoring, 005.02 and 005.04 of this chapter for assessment monitoring, and 006 of this chapter for remedial actions.

003.07 An owner or operator shall specify in the operating record one of the following statistical methods to be used in evaluating ground water monitoring data for each constituent. The statistical test chosen shall be conducted separately for each constituent in each well.

003.07A A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method shall include estimation and testing of the contrasts between each compliance well's mean and the background mean levels for each constituent.

003.07B An analysis of variance (ANOVA) based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method shall include estimation and testing of the contrasts between each compliance well's median and the background median levels for each constituent.

003.07C A tolerance or prediction interval procedure in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the upper tolerance or prediction limit.

003.07D A control chart approach that gives control limits for each constituent.

003.07E Another statistical test method that meets the performance standards of 003.08 of this chapter.

003.07E1 An 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.

003.07E2 The justification shall demonstrate that the alternative method meets the performance standards of 003.08 of this chapter.

003.08 Any statistical method chosen under 003.07 of this chapter shall comply with the following performance standards, as appropriate:

003.08A The statistical method used to evaluate ground water monitoring data shall be appropriate for the distribution of chemical parameters or hazardous constituents.

003.08A1 If the distribution of the chemical parameters of hazardous constituents 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 differ, more than one statistical method may be needed.

003.08B If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a ground water protection standard, the test shall be done at a Type I error level no less than 0.01 for each testing period.

003.08B1 If a multiple comparisons procedure is used, the Type I experiment wise error rate for each testing period shall be no less than 0.05; however, the Type I error of no less than 0.01 for individual well comparisons must be maintained.

003.08B2 This performance standard does not apply to tolerance levels, prediction intervals, or control charts.

003.08C If a control chart approach is used to evaluate ground water monitoring data, the specific type of control chart and its associated parameter values shall be protective of human health and the environment.

003.08C1 The parameters shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

003.08D If a tolerance interval or a predictional interval is used to evaluate ground water monitoring data, the levels of confidence and, for tolerance levels, the percentage of the population that the interval must contain, shall be protective of human health and the environment.

003.08D1 These parameters shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

003.08E The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment.

003.08E1 Any practical quantitation limit that is used in the statistical method shall be the lowest concentration level that can reliably be achieved within the specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.

003.08F If necessary, the statistical method shall include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

003.09 An owner or operator shall determine whether there is a statistically significant increase over background values for each parameter or constituent required in the particular ground water monitoring program that applies to the solid waste disposal area, as determined under 004.01 of this chapter.

003.09A In determining whether a statistically significant increase has occurred, an owner or operator shall compare the ground water quality of each parameter or constituent at each monitoring well designated pursuant to 002.01B to the background value of that constituent, according to the statistical procedures and the performance standards specified in 003.07 and 003.08 of this chapter.

003.09B Within thirty (30) days of completing sampling and analysis, the owner or operator shall determine whether there has been a statistically significant increase over background at each monitoring well.

004 Detection Monitoring Program.

004.01 Detection monitoring is required at all solid waste disposal areas mentioned in section 001. All ground water monitoring must occur pursuant to 002.01A and 002.01B of this chapter.

004.01A At a minimum, a detection monitoring program shall include the monitoring for the constituents listed in Appendix I, which is attached to these regulations and incorporated by this reference.

004.01B The Department may delete any of the monitoring parameters in Appendix I if an owner or operator of a solid waste disposal area can show that the removed constituents are not reasonably expected to be in or derived from the waste contained in the unit.

004.01C The Department may establish a list of indicator parameters for a solid waste disposal area, in lieu of some or all of the constituents in Appendix I, if the alternative parameters provide a reliable indication of releases from the solid waste disposal area to the ground water. In determining alternative parameters, the Department shall consider the following factors:

004.01C1 The types, quantities, and concentrations of constituents in wastes managed in the solid waste disposal area;

004.01C2 The mobility, stability, and persistence of waste constituents or their reaction products in the unsaturated zone beneath the solid waste disposal area;

004.01C3 The detectability of indicator parameters, waste constituents, and reaction products in the ground water; and

004.01C4 The concentration or values and coefficients of variation of monitoring parameters or constituents in the ground water background.

004.02 The monitoring frequency for all constituents listed in Appendix I to these regulations, or in the alternative list described in 004.01C of this chapter, shall be at least semiannual during the active life of the facility including closure and the post-closure period.

004.02A During the first semi-annual sampling event, a minimum of four (4) independent samples from each well (background and downgradient) shall be collected and analyzed for the Appendix I constituents or for the alternative list described in 004.01C of this chapter.

004.02B At least one (1) sample from each well (background and downgradient) shall be collected and analyzed during subsequent semi-annual sampling events.

004.02C Upon request by an owner or operator, the Department may specify an appropriate alternative frequency for repeated sampling and analysis for Appendix I constituents or for the alternative list described in 004.01C of this chapter.

004.02C1 This alternative frequency shall be no less than annual.

004.02C2 The alternative frequency shall be based on the consideration of the following factors:

004.02C2(a) Lithology of the aquifer and unsaturated zone;

004.02C2(b) Hydraulic conductivity of the aquifer and unsaturated zone;

004.02C2(c) Ground water flow rates;

004.02C2(d) Minimum distance between upgradient edge of the solid waste disposal area and downgradient monitoring well screen (minimum distance of travel); and

004.02C2(e) Resource value of the aquifer.

004.03 If an owner or operator determines, pursuant to 003.07 of this chapter, that there is a statistically significant increase over background for one or more of the constituents listed in Appendix I or in the list described in 004.01C of this chapter, at any monitoring well at the boundary specified under 002.01B of this chapter, an owner or operator:

004.03A Shall, within fourteen (14) days of this finding, place a notice in the operating record indicating which constituents have shown statistically significant changes from background levels, and notify the Department that this notice was placed in the operating record;

004.03B Shall, within ninety (90) days (except as provided for in 004.03C of this chapter), establish an assessment monitoring program meeting the requirements of 005 of this chapter; and

004.03C May demonstrate that a source other than the solid waste disposal area caused the contamination or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in ground water quality.

004.03C1 A report documenting this demonstration shall be certified by a qualified ground water scientist and approved by the Department and be placed in the operating record.

004.03C2 If a successful demonstration is made and documented, the owner or operator may continue detection monitoring as specified in this chapter.

004.03C3 If, after ninety (90) days, a successful demonstration is not made, an owner or operator shall initiate an assessment monitoring program as required by 005 of this chapter.

005 Assessment Monitoring Program.

005.01 Assessment monitoring is required whenever a statistically significant increase over background has been detected for one or more of the constituents listed in Appendix I or in the alternative list described in 004.01C of this chapter.

005.02 Within ninety (90) days of triggering an assessment monitoring program, and annually thereafter, an owner or operator shall sample and analyze the ground water for all constituents identified in Appendix II, which is attached to these regulations and incorporated herein by this reference.

005.02A A minimum of one sample from each downgradient well shall be collected and analyzed during each sampling event.

005.02B For any constituent detected in the downgradient wells as a result of the complete Appendix II analysis, a minimum of four (4) independent samples must be collected and analyzed to establish background for the constituents.

005.02C The Department may specify an appropriate subset of wells to be sampled and analyzed for Appendix II constituents during assessment monitoring.

005.02D The Department may delete any of the Appendix II monitoring parameters if an owner or operator can show that the removed constituents are not reasonably expected to be in or derived from the waste contained in the solid waste disposal area.

005.03 Upon request by an owner or operator, the Department may specify an appropriate alternative frequency for repeated sampling and analysis for the full set of Appendix II constituents required by 005.02 of this chapter during the active life including closure and post-closure care of the solid waste disposal area based on a consideration of the following factors:

005.03A Lithology of the aquifer and unsaturated zone;

005.03B Hydraulic conductivity of the aquifer and unsaturated zone;

005.03C Ground water flow rates;

005.03D Minimum distance between upgradient edge of the solid waste disposal area and downgradient monitoring well screen (minimum distance of travel);

005.03E Resource value of the aquifer; and

005.03F Nature (fate and transport) of any constituents detected in response to this chapter.

005.04 After obtaining the results from the initial or subsequent sampling events required in 005.02 of this chapter, an owner or operator shall:

005.04A Within fourteen (14) days, place a notice in the operating record identifying the Appendix II constituents that have been detected and notify the Department that this notice has been placed in the operating record;

005.04B Within ninety (90) days, and on at least a semiannual basis thereafter, resample all wells specified by 002.01 of this chapter; and conduct analyses for all constituents in Appendix I or in the alternative list in 004.01C, and for those constituents in Appendix II that are detected in response to 005.02 of this chapter, and record their concentrations in the facility's operating record.

005.04B1 At least one sample from each well (background and downgradient) shall be collected and analyzed during these sampling events.

005.04B2 Upon request by an owner or operator, the Department may specify an alternative monitoring frequency during the active life including closure and the post-closure period for the constituents referred to in 005.04B.

005.04B2(a) The alternative frequency for Appendix I constituents or the alternative list shall be no less than annual during the active life including closure.

005.04B2(b) The alternative frequency shall be based on consideration of the factors specified in 005.03 of this chapter.

005.04C Establish background concentrations for any constituents detected pursuant to 005.02 or 005.04B of this chapter; and

005.04D Establish ground water protection standards for all constituents detected pursuant to 005.02 or 005.04 of this chapter.

005.04D1 The ground water protection standards shall be established in accordance with 005.08 or 005.09 of this chapter.

005.05 If the concentrations of all Appendix II constituents are shown to be at or below background values, using the statistical procedures in 003.07, for two (2) consecutive sampling events, an owner or operator shall notify the Department of this finding and may return to detection monitoring.

005.06 If the concentrations of all Appendix II constituents are above background values, but all concentrations are below the ground water protection standards established under 005.08 or 005.09 of this chapter, using the statistical procedures in 003.07, an owner or operator shall continue assessment monitoring in accordance with this chapter.

005.07 If one or more Appendix II constituents are detected at statistically significant levels above the ground water protection standards established under 005.08 or 005.09 of this chapter in any sampling event, an owner or operator

005.07A Shall, within fourteen (14) days of this finding, place a notice in the operating record identifying the Appendix II constituents that have 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;

005.07B Shall characterize the nature and extent of the release by installing additional monitoring wells as necessary;

005.07C Shall install at least one (1) additional monitoring well at the facility boundary in the direction of the contaminant migration and sample this well in accordance with 005.04B of this chapter;

005.07D Shall 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 005.07B;

005.07E Shall initiate an assessment of remedial measures as required by 006 of this chapter within ninety (90) days; and

005.07F May demonstrate that a source other than the solid waste disposal area caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in ground water quality.

005.07F1 A report documenting this demonstration shall be certified by a qualified ground water scientist and approved by the Department and be placed in the operating record.

005.07F2 If a successful demonstration is made and documented, the owner or operator shall continue monitoring pursuant to 005 of this chapter, and may return to detection monitoring if the Appendix II constituents are at or below background as specified in 005.05.

005.07F3 Until a successful demonstration is made, an owner or operator shall comply with the requirements of 005.07 of this chapter, including initiating an assessment of remedial measures.

005.08 An owner or operator shall establish a ground water protection standard for each Appendix II constituent detected in the ground water. The ground water protection standard shall be:

005.08A For constituents for which a maximum contaminant level (MCL) has been promulgated under section 1412 of the Safe Drinking Water Act, codified under 40 C.F.R. section 141, the MCL for that constituent;

005.08B For constituents for which MCLs have not been promulgated, the background concentration for the constituent established from wells in accordance with 002.01A; or

005.08C For constituents for which the background level is higher than the MCL identified under 005.08B of this chapter or health based levels identified under 005.09A, the background concentration.

005.09 The Department may establish an alternative ground water protection standard for constituents for which MCLs have not been established. These ground water protection standards shall be appropriate health based levels that satisfy the following criteria:

005.09A The level is derived in a manner consistent with EPA guidelines for assessing the health risks of environmental pollutants (51 Fed. R. 33992, 34006, 34014, 34028, Sept. 24, 1986);

005.09B The level is based on scientifically valid studies conducted in accordance with the Toxic Substances Control Act, Good Laboratory Practice Standards (40 C.F.R. sec. 792), or the equivalent;

005.09C For carcinogens, the level represents a concentration associated with an excess lifetime cancer risk level (due to continuous lifetime exposure) with the 1 x 10^{-4} to 1 x 10^{-6} range; and

005.09D 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.

005.09D1 For purposes of 005.09D, systemic toxicants include toxic chemicals that cause effects other than cancer or mutation.

005.10 In establishing ground water protection standards under 005.09 of this chapter, the Department may consider the following:

005.10A Multiple contaminants in the ground water;

005.10B Exposure threats to sensitive environmental receptors; and

005.10C Other site-specific exposure or potential exposure to ground water.

006 Assessment of Remedial Measures.

006.01 If a constituent listed in Appendix II is detected at a statistically significant level exceeding the ground water protection standards defined in 005.08 and 005.09 of this

chapter, the owner or operator shall begin remedial action in accordance with Title 118 - Ground Water Quality Standards and Use Classification.

006.02 An owner or operator shall continue to monitor in accordance with the monitoring program specified in 005 of this chapter.

Enabling Legislation: Neb. Rev. Stat. §§13-2034; 81-1504; 81-1505

Legal Citation: Title 132, Ch. 7, Nebraska Department of Environmental Quality