New Mexico Environment Department - Solid Waste Bureau
Guidance on Alternative Ground Water Constituents for Detection Monitoring [1]

Regulatory Reference: Subsection A of 20.9.9.11 NMAC

Applicability: All solid waste disposal facilities for which ground water monitoring is required.

Purpose: To provide guidance for submitting requests to revise ground water monitoring constituents.

Removal of Constituents and Alternative Constituents List [2]

After background concentrations have been approved by the Department for all constituents identified in Subsection A of 20.9.9.20 NMAC, owners/operators of solid waste disposal facilities may request specific approval to amend the required list of ground water monitoring constituents during detection monitoring as authorized by 20.9.9.11.A NMAC. Amendments allowed under this authority include the following: [4]

1. *The removal of testing for particular constituents in Subsection A of 20.9.9.20 NMAC for a municipal landfill if it can be shown that the particular constituents are not reasonably expected to be in or derived from the waste contained in the landfill.* (20.9.9.11.A(1) NMAC)

   In order for the Department to consider removal of constituents from the detection monitoring list, the owner or operator must make an appropriate demonstration that constituents requested for removal are not reasonably expected to be in, or derived from, the landfill waste. The department will consider the following criteria in reviewing requests to remove any of the constituents identified by Subsection A of 20.9.9.20 NMAC:

   (a) The owner or operator must demonstrate definite knowledge of the nature of wastes accepted at the facility in order to document the presence or absence in the waste of the constituents requested for removal from the detection monitoring list. The owner or operator must also demonstrate that the constituents requested for removal are not degradation or reaction products of other constituents (i.e., parent compounds) potentially present in the waste. Documentation suitable for supporting this demonstration must include:
      i) A narrative stating that all waste screening records for the operational period of the landfill have been reviewed, and the constituents being considered for removal and any parent compounds of such constituents are not expected to be contained in the disposed waste based on waste screenings; and
      ii) Results of leachate analyses from the entire period of the approved leachate monitoring plan indicating the absence of the constituents requested for removal and any parent compounds of such constituents; or a narrative stating that leachate has not been generated at the landfill; and

iii) Written documentation showing the parent compounds, if any, of the constituents proposed for removal from the detection monitoring list.

(b) The owner or operator must demonstrate that the constituents proposed for removal from the detection monitoring list and any parent compounds have not been detected in any monitoring wells throughout the approved detection monitoring plan history. Documentation suitable for supporting this demonstration must include:

i) A narrative stating that all appropriate ground water monitoring records have been reviewed, and the constituents being considered for removal and any parent compounds have not been detected in any monitoring wells throughout the approved detection monitoring plan history; and

ii) A list identifying all documents previously submitted to the Department and reviewed by the owner or operator (or designee) that supports the narrative statement.

Additional documentation that the owner/operator believes supports the demonstration for removal of constituents from the detection monitoring list may also be submitted for the Department's consideration.

2. *Establish an alternate list of inorganic indicator parameter constituents for a landfill in lieu of some or all of the heavy metals listed or referenced in Subsection A of 20.9.9.20 NMAC if the alternative constituents provide a reliable indication of inorganic releases from the landfill to the ground water; in determining alternative constituents, the department shall consider the following factors: the types, quantities, and concentrations of constituents in wastes managed at the landfill; the mobility, stability, and persistence of constituents or their reaction products in the unsaturated earth zone beneath the landfill; the detectability of indicator parameters, waste constituents, and reaction products in the ground water; and the concentration or values and coefficients of variation of monitoring parameters or constituents in the ground water background.* (20.9.9.11.A(1) NMAC) [3]

In order for the Department to consider an alternate list of inorganic indicator parameter constituents, the owner or operator must make an appropriate demonstration that the alternate constituents will serve as a suitable surrogate for the heavy metals identified by Subsection A of 20.9.9.20 NMAC. The department will consider the following criteria in reviewing requests to replace heavy metals with inorganic indicator parameter constituents:

(a) The owner or operator must demonstrate that the proposed inorganic indicator parameter constituents are expected to be present in the waste. Documentation suitable for supporting this demonstration must include:

i) Results of leachate analyses from the entire period of the approved leachate monitoring plan indicating the persistent presence of the constituents/parameters proposed to serve as surrogates for heavy metals; or

ii) A narrative stating that leachate has not been generated at the landfill and affirming that the proposed inorganic indicator parameter constituents are

expected to be present in leachate generated from the waste; citations for publications identifying constituents and parameters that are characteristic of leachate generated by the type of waste contained in the landfill must also be provided.

(b) The owner or operator must demonstrate that the proposed inorganic indicator parameter constituents are expected to migrate with minimal attenuation through the vadose zone and ground water. Documentation suitable for supporting this demonstration must include a narrative addressing the potential for attenuation of the proposed inorganic indicator parameter constituents and any specific mechanisms (e.g., sorption, chemical precipitation, degradation, etc.) that might be relevant to the constituents. The documentation must also include citations for publications referenced in the narrative.

(c) The owner or operator must demonstrate that the proposed inorganic indicator parameter constituents are capable of being detected by commonly utilized analytical methods. Documentation suitable for supporting this demonstration must include a narrative identifying analytical methodologies capable of detecting the constituents and the probable method detection limits and practical quantitation limits for the constituents. The narrative must also discuss the laboratory availability of the identified methods.

(d) The owner or operator must demonstrate that appropriate background values in ground water for the proposed inorganic indicator parameter constituents exist at the site such that contributions of the constituents to ground water from leachate can be observed in ground water analytical data. Documentation suitable for supporting this demonstration must include a table presenting background values and coefficients of variation in site monitoring wells for the proposed inorganic indicator parameter constituents and constituent concentrations/values in leachate (based on leachate analyses from the site or literature values if leachate has not been generated at the site); and a narrative evaluating the likelihood of detecting elevated constituent values in ground water at the site in the event of leachate migration to ground water.

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1) Additional guidance can be obtained from EPA publication EPA/530-R-93-017, Solid Waste Disposal Facility Criteria - Technical Manual.
2) Regardless of approval by the department of an alternate constituent list under Subsection A of 20.9.9.11 NMAC, the minimum frequency for testing for all the constituents in Subsection A and C of 20.9.9.20 NMAC shall be at least once every five years in addition to the required frequencies for the alternate list.
3) Alternative constituents proposed for detection monitoring in lieu of some or all heavy metals may include water quality parameters such as pH, major anions and cations (including Stiff and Piper diagrams), and specific conductance.
4) If a removed constituent is detected during the mandatory 5-year monitoring event for constituents listed in Subsection A of 20.9.9.20 NMAC, the constituent will be added to the approved alternative constituent list.

List of Associated Attachments:

Attachment 1: 20.9.9.11 NMAC, Detection Monitoring Plan
Attachment 2: 20.9.9.20 NMAC Constituents and Parameters
Attachment 3: 40 CFR Part 258, Appendix I - Constituents for Detection Monitoring
Attachment 4: 20.6.2.3103 NMAC, Standards for Ground Water

Attachment 1

TITLE 20 ENVIRONMENTAL PROTECTION
CHAPTER 9 SOLID WASTE
PART 9 SOLID WASTE FACILITY GROUND WATER MONITORING SYSTEM PLAN AND GROUND WATER MONITORING PLAN; CORRECTIVE ACTION

20.9.9.11 DETECTION MONITORING PLAN.

A. The owner or operator shall conduct detection monitoring at all ground water detection monitoring wells unless such monitoring has been suspended in accordance with Subsection C of 20.9.9.8 NMAC. The detection monitoring program shall include the monitoring for constituents and parameters listed and referenced in Subsection A of 20.9.9.20 NMAC, and shall be conducted at least semiannually during the active life and post-closure care period of the facility. After background concentrations have been approved as required in Subsection E of 20.9.9.10 NMAC for all constituents in Subsection A of 20.9.9.20 NMAC, the owner or operator may request a specific approval that the ground water detection monitoring program description be amended to:

(1) not require testing for particular constituents in Subsection A of 20.9.9.20 NMAC for a municipal landfill if it can be shown that the particular constituents are not reasonably expected to be in or derived from the waste contained in the landfill; and

(2)establish an alternate list of inorganic indicator parameters constituents for a landfill in lieu of some or all of the heavy metals listed or referenced in Subsection A of 20.9.9.20 NMAC if the alternative constituents provide a reliable indication of inorganic releases from the landfill to the ground water; in determining alternative constituents, the department shall consider the following factors:

(a) the types, quantities, and concentrations of constituents in wastes managed at the landfill;
(b) the mobility, stability, and persistence of constituents or their reaction products in the unsaturated earth zone beneath the landfill;
(c) the detectability of the constituents, and reaction products in the ground water; and
(d) the concentrations or values and coefficients of variation of levels of the constituents in the ground water;

(3) allow annual sampling of the approved alternate list after the first year based on 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 landfill and downgradient monitoring well screen (minimum distance of travel); and
(e)resource value of the aquifer.

B. Regardless of approval by the department of an alternate constituent list under Subsection A of this section, the minimum frequency for testing for all the constituents in Subsection A of 20.9.9.20 NMAC shall be at least once every five years in addition to the required frequencies for the alternate list.

[20.9.9.11 NMAC - Rp, 20 NMAC 9.1.VIII.804, 8/2/2007]

Attachment 2

TITLE 20 ENVIRONMENTAL PROTECTION
CHAPTER 9 SOLID WASTE
PART 9 SOLID WASTE FACILITY GROUND WATER MONITORING SYSTEM PLAN AND GROUND WATER MONITORING PLAN; CORRECTIVE ACTION

20.9.9.20 CONSTITUENTS AND PARAMETERS. Constituents and parameters to be evaluated under the requirements of 20.9.9.1 - 20.9.9.19 NMAC include:

A. every constituent listed in the following:
(1) 40 CFR 258 Appendix I;
(2) 20.6.2.3103 NMAC, including the parameter of pH;

B. all constituents listed in 40 CFR 258 Appendix II, 20.6.2.3103 NMAC, potential toxic pollutants listed in 20.6.2.7 NMAC; and

C. the following constituents and parameters:
(1) calcium (CAS No. 7440-70-2);
(2) magnesium (CAS No. 7439-95-4);
(3) potassium (CAS No. 7440-09-7);
(4) sodium (CAS No. 7440-23-5);
(5) ammonia (CAS No. 1331-21-6);
(6) bicarbonate alkalinity;
(7) carbonate alkalinity;
(8) total nitrogen;
(9) total kjeldahl nitrogen;
(10) total organic carbon;
(11) phosphate;
(12) specific conductance;
(13) temperature;
(14) depth to ground water; and
(15) ground water elevation.

D. When additional constituents are added to ground water monitoring requirements through updates to the rules cited, the new constituents shall be added to the routine sampling frequency for a particular landfill. Background quality for the new constituent shall be determined after a sufficient number of samples are collected during routine sampling, unless a new constituent is detected above the AML, in which case the procedure in Subsection E of 20.9.9.10 NMAC shall be used to determine background concentration.

E. A list of constituents and parameters to be evaluated under the requirements of 20.9.9 NMAC will be made available to the public and posted on the NMED website.
[20.9.9.20 NMAC - N, 8/2/2007]

Attachment 3

40 CFR Part 258 - CRITERIA FOR MUNICIPAL SOLID WASTE LANDFILLS

Appendix I to Part 258—Constituents for Detection Monitoring

Common name[1]	CAS RN[2]
Inorganic Constituents:	
(1) Antimony	(Total)
(2) Arsenic	(Total)
(3) Barium	(Total)
(4) Beryllium	(Total)
(5) Cadmium	(Total)
(6) Chromium	(Total)
(7) Cobalt	(Total)
(8) Copper	(Total)
(9) Lead	(Total)
(10) Nickel	(Total)
(11) Selenium	(Total)
(12) Silver	(Total)
(13) Thallium	(Total)
(14) Vanadium	(Total)
(15) Zinc	(Total)
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; Idomethane	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

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

[2]Chemical Abstract Service registry number. Where "Total" is entered, all species in the ground water that contain this element are included.

[70 FR 34555, June 14, 2005; 70 FR 44150, Aug. 1, 2005]

Attachment 4

TITLE 20 ENVIRONMENTAL PROTECTION
CHAPTER 6 WATER QUALITY
PART 2 GROUND AND SURFACE WATER PROTECTION

20.6.2.3103 STANDARDS FOR GROUND WATER OF 10,000 mg/l TDS CONCENTRATION OR LESS: The following standards are the allowable pH range and the maximum allowable concentration in ground water for the contaminants specified unless the existing condition exceeds the standard or unless otherwise provided in Subsection D of Section 20.6.2.3109 NMAC. Regardless of whether there is one contaminant or more than one contaminant present in ground water, when an existing pH or concentration of any water contaminant exceeds the standard specified in Subsection A, B, or C of this section, the existing pH or concentration shall be the allowable limit, provided that the discharge at such concentrations will not result in concentrations at any place of withdrawal for present or reasonably foreseeable future use in excess of the standards of this section. These standards shall apply to the dissolved portion of the contaminants specified with a definition of dissolved being that given in the publication "*methods for chemical analysis of water and waste of the U.S. environmental protection agency*," with the exception that standards for mercury, organic compounds and non-aqueous phase liquids shall apply to the total unfiltered concentrations of the contaminants.

A. Human Health Standards-Ground water shall meet the standards of Subsection A and B of this section unless otherwise provided. If more than one water contaminant affecting human health is present, the toxic pollutant criteria as set forth in the definition of toxic pollutant in Section 20.6.2.1101 NMAC for the combination of contaminants, or the Human Health Standard of Subsection A of Section 20.6.2.3103 NMAC for each contaminant shall apply, whichever is more stringent. Non-aqueous phase liquid shall not be present floating atop of or immersed within ground water, as can be reasonably measured.

(1) Arsenic (As)…….……0.1 mg/l
(2) Barium (Ba)……...……...1.0 mg/l
(3) Cadmium (Cd)……..……...0.01 mg/l
(4) Chromium (Cr)……..……0.05 mg/l
(5) Cyanide (CN)……..……..0.2 mg/l
(6) Fluoride (F)……..…….1.6 mg/l
(7) Lead (Pb)…….0.05 mg/l
(8) Total Mercury (Hg)……...0.002 mg/l
(9) Nitrate (NO_3 as N)……...10.0 mg/l
(10) Selenium (Se)……0.05 mg/l
(11) Silver (Ag)…….0.05 mg/l
(12) Uranium (U)……....0.03 mg/l
(13) Radioactivity: Combined Radium-226 & Radium-228…….30 pCi/l
(14) Benzene…..……...0.01 mg/l
(15) Polychlorinated biphenyls (PCB's)……..0.001 mg/l
(16) Toluene……...0.75 mg/l
(17) Carbon Tetrachloride……..0.01 mg/l
(18) 1,2-dichloroethane (EDC) ……..…0.01 mg/l
(19) 1,1-dichloroethylene (1,1-DCE) ……...0.005 mg/l
(20) 1,1,2,2-tetrachloroethylene (PCE) ……..0.02 mg/l
(21) 1,1,2-trichloroethylene (TCE) ……...0.1 mg/l
(22) ethylbenzene…….……0.75 mg/l
(23) total xylenes…….…….....0.62 mg/l
(24) methylene chloride…….……0.1 mg/l
(25) chloroform…….…….0.1 mg/l
(26) 1,1-dichloroethane…….……0.025 mg/l
(27) ethylene dibromide (EDB) ……..…0.0001 mg/l
(28) 1,1,1-trichloroethane…….……...…0.06 mg/l
(29) 1,1,2-trichloroethane…….……...0.01 mg/l

(30) 1,1,2,2-tetrachloroethane…….…….0.01 mg/l
(31) vinyl chloride…….…….0.001 mg/l
(32) PAHs: total naphthalene plus monomethylnaphthalenes…….0.03 mg/l
(33) benzo-a-pyrene…….……0.0007 mg/l

B. Other Standards for Domestic Water Supply

(1) Chloride (Cl) …….……...250.0 mg/l
(2) Copper (Cu) …….……....1.0 mg/l
(3) Iron (Fe) …….……...…1.0 mg/l
(4) Manganese (Mn) …….……..…0.2 mg/l
(6) Phenols…….……..…0.005 mg/l
(7) Sulfate (SO_4) ……..……..600.0 mg/l
(8) Total Dissolved Solids (TDS) …….…...……1000.0 mg/l
(9) Zinc (Zn) …….……...……10.0 mg/l
(10) pH…….…….…….between 6 and 9

C. Standards for Irrigation Use - Ground water shall meet the standards of Subsection A, B, and C of this section unless otherwise provided.

(1) Aluminum (Al)…….. …….……..…5.0 mg/l
(2) Boron (B) …….……...0.75 mg/l
(3) Cobalt (Co) …….…….0.05 mg/l
(4) Molybdenum (Mo) …….……...1.0 mg/l
(5) Nickel (Ni) …….……....0.2 mg/l

[2-18-77, 1-29-82, 11-17-83, 3-3-86, 12-1-95; 20.6.2.3103 NMAC - Rn, 20 NMAC 6.2.III.3103, 1-15-01; A, 9-26-04]

[Note: For purposes of application of the amended numeric uranium standard to past and current water discharges (as of 9-26-04), the new standard will not become effective until June 1, 2007. For any new water discharges, the uranium standard is effective 9-26-04.]