**Section 811.320 Groundwater Quality Standards**

a) Applicable Groundwater Quality Standards

1) Groundwater quality must be maintained at each constituent's background concentration, at or beyond the zone of attenuation. The applicable groundwater quality standard established for any constituent must be:

A) The background concentration; or

B) The Board established standard adjusted by the Board in accordance with the justification procedure of subsection (b).

2) Any statistically significant increase above an applicable groundwater quality standard established under subsection (a)(1) that is attributable to the facility and that occurs at or beyond the zone of attenuation within 100 years after closure of the last unit accepting waste within such a facility must constitute a violation.

3) For the purposes of this Part:

A) "Background concentration" means that concentration of a constituent that is established as the background in accordance with subsection (d); and

B) "Board established standard" is the concentration of a constituent adopted by the Board as a groundwater quality standard adopted by the Board under Section 14.4 of the Act or Section 8 of the Illinois Groundwater Protection Act [415 ILCS 55].

b) Justification for Adjusted Groundwater Quality Standards

1) An operator may petition the Board for an adjusted groundwater quality standard in accordance with the procedures specified in Section 28.1 of the Act and 35 Ill. Adm. Code 104.Subpart D.

2) For groundwater that contains naturally occurring constituents that meet the applicable requirements of 35 Ill. Adm. Code 620.410, 620.420, 620.430, or 620.440 the Board will specify adjusted groundwater quality standards no greater than those of 35 Ill. Adm. Code 620.410, 620.420, 620.430 or 620.440, respectively, upon a demonstration by the operator that:

A) The change in standards will not interfere with, or become injurious to, any present or potential beneficial uses for the water;

B) The change in standards is necessary for economic or social development, by providing information including, but not limited to, the impacts of the standards on the regional economy, social disbenefits such as loss of jobs or closing of landfills, and economic analysis contrasting the health and environmental benefits with costs likely to be incurred in meeting the standards; and

C) All technically feasible and economically reasonable methods are being used to prevent the degradation of the groundwater quality.

3) Notwithstanding subsection (b)(2), in no case must the Board specify adjusted groundwater quality standards for a MSWLF unit greater than the following levels:

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| Chemical | Concentration  (mg/ℓ) |
| Arsenic (CAS No. 7440-38-2) | 0.05 |
| Barium (CAS No. 7440-39-3) | 1.0 |
| Benzene (CAS No. 71-43-2) | 0.005 |
| Cadmium (CAS No. 7440-43-9) | 0.01 |
| Carbon tetrachloride (CAS No. 56-23-5) | 0.005 |
| Chromium (hexavalent) (CAS No. 18540-29-9) | 0.05 |
| 1,4-Dichlorobenzene (CAS No. 106-46-7) | 0.075 |
| 1,2-Dichloroethane (CAS No. 107-06-2) | 0.005 |
| 1,1-Dichloroethylene (CAS No. 75-35-4) | 0.007 |
| 2,4-Dichlorophenoxy acetic acid (CAS No. 94-75-7) | 0.1 |
| Endrin (CAS No. 72-20-8) | 0.0002 |
| Fluoride (CAS No. 16984-48-8) | 4 |
| Lindane (CAS No. 58-89-9) | 0.004 |
| Lead (CAS No. 7439-92-1) | 0.05 |
| Mercury (CAS No. 7439-97-6) | 0.002 |
| Methoxychlor (CAS No. 72-43-5) | 0.1 |
| Nitrate (CAS No. 14797-55-8) | 10 |
| Selenium (CAS No. 7782-49-2) | 0.01 |
| Silver (CAS No. 7440-22-4) | 0.05 |
| Toxaphene (CAS No. 8001-35-2) | 0.005 |
| l,l,l-Trichloroethane (CAS No. 71-55-6) | 0.2 |
| Trichloroethylene (CAS No. 79-01-6) | 0.005 |
| 2,4,5-Trichlorophenoxyacetic acid (CAS No. 93-76-5) | 0.01 |
| Vinyl chloride (CAS No. 75-01-4) | 0.002 |

BOARD NOTE: Subsection (b)(3) is derived from 40 CFR 258.40 Table 1.

4) For groundwater that contains naturally occurring constituents that do not meet the standards of 35 Ill. Adm. Code 620.410, 620.420, 620.430, or 620.440, the Board will specify adjusted groundwater quality standards, upon a demonstration by the operator that:

A) The groundwater does not presently serve as a source of drinking water;

B) The change in standards will not interfere with, or become injurious to, any present or potential beneficial uses for those waters;

C) The change in standards is necessary for economic or social development, by providing information including, but not limited to, the impacts of the standards on the regional economy, social disbenefits such as loss of jobs or closing of landfills, and economic analysis contrasting the health and environmental benefits with costs likely to be incurred in meeting the standards; and

D) The groundwater cannot presently, and will not in the future, serve as a source of drinking water because:

i) It is impossible to remove water in usable quantities;

ii) The groundwater is situated at a depth or location such that recovery of water for drinking purposes is not technologically feasible or economically reasonable;

iii) The groundwater is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption;

iv) The total dissolved solids content of the groundwater is more than 3,000 mg/ℓ and that water will not be used to serve a public water supply system; or

v) The total dissolved solids content of the groundwater exceeds 10,000 mg/ℓ.

c) Determination of the Zone of Attenuation

1) The zone of attenuation, within which concentrations of constituents in leachate discharged from the unit may exceed the applicable groundwater quality standard of this Section, is a volume bounded by a vertical plane at the property boundary or 100 feet from the edge of the unit, whichever is less, extending from the ground surface to the bottom of the uppermost aquifer and excluding the volume occupied by the waste.

2) Zones of attenuation must not extend to the annual high-water mark of navigable surface waters.

3) Overlapping zones of attenuation from units within a single facility may be combined into a single zone for the purposes of establishing a monitoring network.

d) Establishment of Background Concentrations

1) The initial monitoring to determine background concentrations must commence during the hydrogeological assessment required by Section 811.315. The background concentrations for those parameters identified in Sections 811.315(e)(1)(G) and 811.319(a)(2) and (a)(3) must be established based on consecutive quarterly sampling of wells for a minimum of one year, monitored in accordance with the requirements of subsections (d)(2), (d)(3) and (d)(4). Non-consecutive data may be considered by the Agency, if only one data point from a quarterly event is missing, and it can be demonstrated that the remaining data set is representative of consecutive data in terms of any seasonal or temporal variation. Statistical tests and procedures must be employed, in accordance with subsection (e), depending on the number, type and frequency of samples collected from the wells, to establish the background concentrations.

2) Adjustments to the background concentrations must be made if changes in the concentrations of constituents observed in background wells over time are determined, in accordance with subsection (e), to be statistically significant, and due to natural temporal or spatial variability or due to an off-site source not associated with the landfill or the landfill activities. Such adjustments may be conducted no more frequently than once every two years during the operation of a facility and modified subject to approval by the Agency. Non-consecutive data may be used for an adjustment upon Agency approval. Adjustments to the background concentration must not be initiated prior to November 27, 2009 unless required by the Agency.

3) Background concentrations determined in accordance with this subsection must be used for the purposes of establishing groundwater quality standards, in accordance with subsection (a). The operator must prepare a list of the background concentrations established in accordance with this subsection. The operator must maintain such a list at the facility, must submit a copy of the list to the Agency for establishing standards in accordance with subsection (a), and must provide updates to the list within ten days of any change to the list.

4) A network of monitoring wells must be established upgradient from the unit, with respect to groundwater flow, in accordance with the following standards, in order to determine the background concentrations of constituents in the groundwater:

A) The wells must be located at such a distance that discharges of contaminants from the unit will not be detectable;

B) The wells must be sampled at the same frequency as other monitoring points to provide continuous background concentration data, throughout the monitoring period; and

C) The wells must be located at several depths to provide data on the spatial variability.

5) A determination of background concentrations may include the sampling of wells that are not hydraulically upgradient of the waste unit if the following conditions are met:

A) Hydrogeologic conditions do not allow the owner or operator to determine what wells are hydraulically upgradient of the waste; and

B) Sampling at other wells will provide an indication of background concentrations that is representative of that which would have been provided by upgradient wells.

6) If background concentrations cannot be determined on site, then alternative background concentrations may be determined from actual monitoring data from the aquifer of concern, which includes, but is not limited to, data from another landfill site that overlies the same aquifer.

e) Statistical Analysis of Groundwater Monitoring Data

1) Statistical tests must be used to analyze groundwater monitoring data. One or more of the normal theory statistical tests must be chosen first for analyzing the data set or transformations of the data set. If these normal theory tests are demonstrated to be inappropriate, tests listed in subsection (e)(4) must be used. The level of significance (Type I error level) must be no less than 0.01, for individual well comparisons, and no less than 0.05, for multiple well comparisons. The statistical analysis must include, but not be limited to, the accounting of data below the detection limit of the analytical method used, the establishment of background concentrations and the determination of whether statistically significant changes have occurred in:

A) The concentration of any chemical constituent with respect to the background concentration or maximum allowable predicted concentration; and

B) The established background concentration of any chemical constituents over time.

2) The statistical test or tests used must be based upon the sampling and collection protocol of Sections 811.318 and 811.319.

3) Monitored data that are below the level of detection must be reported as not detected (ND). The level of detection for each constituent must be the practical quantitation limit (PQL) and must be the lowest concentration that is protective of human health and the environment, and can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions. In no case, must the PQL be established above the level that the Board has established for a groundwater quality standard under the Illinois Groundwater Protection Act. The following procedures must be used to analyze such data, unless an alternative procedure in accordance with subsection (e)(4), is shown to be applicable:

A) If the percentage of non-detects in the data base used is less than 15 percent, the operator must replace NDs with the PQL divided by two, then proceed with the use of one or more of the normal theory statistical tests;

B) If the percentage of non-detects in the data base used is between 15 and 50 percent, and the data are normally distributed, the operator must use Cohen's or Aitchison's adjustment to the sample mean and standard deviation, followed by an applicable statistical procedure;

C) If the percentage of non-detects in the database used is above 50 percent, then the owner or operator must use an alternative procedure in accordance with subsection (e)(4).

4) Nonparametric statistical tests or any other statistical test if it is demonstrated to meet the requirements of 35 Ill. Adm. Code 724.197(i).

(Source: Amended at 44 Ill. Reg. 15577, effective September 3, 2020)