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## Comparison of 1990, 1994 and 2003 MSW Ground Water Monitoring Requirements

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### PURPOSE

This educational guideline presents major changes made to the municipal solid waste (MSW) program's ground water monitoring requirements in the 1990, 1994, and 2003 versions.

The comparison only presents the major changes, and is not a complete list.

### APPLICABLE RULES/STATUTES

MSW: OAC 3745-27-10

Cross References:

#0117 *Ground Water Monitoring Requirements for Closed Facilities*.

### DETAILED DISCUSSION

Knowing what the major differences are between the 1990, 1994, and 2003 rules regarding ground water monitoring is helpful to MSW owners and operators considering whether to voluntarily upgrade their program to meet current standards.

For determining which version of the ground water monitoring rules apply to a closed facility, see #0117 *Ground Water Monitoring Requirements for Closed Facilities*.

Attachment I highlights the amendments and added flexibility in the 1994 rules as compared to the 1990 rules.

Attachment II highlights the added requirements in the 1994 rules as compared to the 1990 rules.

Attachment III highlights the amendments and added flexibility in the 2003 rules as compared to the 1994 rules.

Attachment IV highlights the added requirements in the 2003 rules as compared to the 1994 rules.

### POINT OF CONTACT

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## ATTACHMENT I

### Amendments and Added Flexibility in 1994 Rules as Compared to 1990 Rules

There are several amendments and added flexibility in the revised 1994 regulations for municipal waste landfills (1994 rules) as compared to the 1990 solid waste landfill rules (1990 rules). These changes are:

1. Additional Time to Submit Ground Water Analysis Data and Statistical Analyses Results [OAC 3745-27-10(C)(10)]: Under the 1990 rules, a facility had to submit the ground water analysis and statistical analysis results within 60 days of the date of sampling. The 1994 rules expanded this requirement to 75 days.
2. Sampling Frequency and Parameter Customization Available in the Detection Monitoring Program: The 1990 rules did not provide for customization of the municipal solid waste landfill ground water detection monitoring requirements. The 1994 rules have four opportunities that allow owners and operators of facilities to customize the sampling frequency and monitoring parameters to reflect the conditions at the facility. These opportunities are:
  - ⇒ Alternate Monitoring Parameter List [OAC 3745-27-10(D)(2)]: This provision allows for reducing the detection monitoring list to remove those constituents that cannot reasonably be derived from waste in the facility.
  - ⇒ Alternate Inorganic Parameter List [OAC 3745-27-10(D)(3)]: This provision allows for replacing inorganic statistical indicator parameters with other inorganic parameters that may be better suited as statistical indicator parameters.
  - ⇒ Alternate Parameters for Low-Yield Wells [OAC 3745-27-10(D)(4)]: This provision allows for reducing the number of parameters sampled for in low-yield wells.
  - ⇒ Alternative Sampling and Analysis Frequency [OAC 3745-27-10(D)(6)]: This provision allows for reducing the frequency of sampling.
3. Additional Flexibility in Confirming or Disputing the Cause of a Statistical Trigger [OAC 3745-27-10(D)(7)(c)]: Under the 1990 rules, the only way to disprove a false indication of a statistically significant increase in concentration (statistical trigger) of a detection parameter was to resample the well and perform the analysis and statistical evaluation again.

The 1994 rules allow the owner or operator not only the ability to resample, but also to present evidence that the trigger was due to faulty statistics, laboratory error, variations in ambient ground water quality, and other causes of a statistical trigger that are not related to a release of leachate from the facility. The owner or operator has 105 days from submitting the statistical trigger results to the agency to submit and have approved the demonstration of a false statistical trigger.

4. Fewer Assessment Monitoring Parameters [OAC 3745-27-10(E)]: The number of parameters in Appendix II, used when a facility is to undergo assessment, decreased from 241 in the 1990 rules to 213 in the 1994 rules.
5. Corrective Measures Study - "No Action" Alternative Added: The 1994 rules set explicit criteria for determining when "no action" can be the remedy chosen during a corrective measures study [OAC 3745-27-10(F)(8)]. There was no provision in the 1990 rules to select a "no action" response. Remediation was required.

## **ATTACHMENT II**

### **Added Requirements in 1994 Rules as Compared to 1990 Rules**

While there are several benefits to following the 1994 rules compared to the 1990 rules, there are also added requirements worth pointing out. These added requirements are:

1. Increased Sampling and Reporting Required Under Assessment [OAC 3745-27-10(E)(4)]: There is no regular sampling and analysis schedule for assessment monitoring wells prior to the determination of rate, extent of migration, and concentrations of the leachate-derived constituents under the 1990 rules. A facility conducting a ground water quality assessment under the 1990 rules is only required to perform an initial Appendix II sampling of the affected well and background well(s) followed by subsequent sampling of monitoring wells for leachate-derived constituents determined to be above background. Only the constituents above background need to be sampled to determine rate, extent of migration, and concentration, and an owner or operator is not required to follow a specified sampling frequency or schedule while implementing the ground water quality assessment plan. After the owner or operator has determined rate, extent of migration, and concentration of the leachate-derived constituents in accordance with the plan, quarterly sampling of the contaminants is necessary to monitor rate, extent of migration, and concentration until the owner or operator is released from this obligation by the director.

In contrast, the 1994 rules require semiannual sampling events for all Appendix I constituents and any Appendix II constituents determined to have been released to ground water (i.e., those constituents exceeding background concentrations), as well as annual sampling events for all Appendix II parameters. These events are initiated within 180 days of implementing the ground water quality assessment plan. Further, the 1994 rules also require additional sampling of background monitoring wells to achieve a background data set of four independent samples for any constituent exhibiting a statistically significant concentration and additional assessment monitoring reporting requirements (quarterly assessment reports).

2. More Parameters on the Ground Water Sampling and Analysis Constituent List for Detection Monitoring [OAC Rule 3745-27-10(D)]: Under 1990 rules, the owner or operator was required to sample and analyze for 70 constituents in Appendix I (20 water quality parameters, 12 trace metals, and 38 volatile organic compounds). Appendix I of the 1994 rules lists 79 constituents for the owner or operator to sample and analyze during detection monitoring (17 water quality parameters, 15 trace metals, and 47 volatile organic compounds).

## ATTACHMENT III

### Amendments and Added Flexibility in 2003 Rules as Compared to 1994 Rules

There are several amendments and added flexibility in the revised 2003 regulations for municipal waste landfills (2003 rules) as compared to the 1994 solid waste landfill rules (1994 rules). These changes are:

1. If installation of a well is not practical, the director may approve surface water monitoring [OAC 3745-27-10(B)(1)]: The 2003 rules provide for the situation where it is not practical to place a well in an area, but it is possible to monitor the ground water quality passing directly downgradient of the limits of solid waste placement if it discharges to a seep, spring, or stream.
2. Parameters for monitoring the uppermost aquifer system were changed [OAC 3745-27-10(D)(5)(a)(i)(a)]: The 2003 rules removed chemical oxygen demand, accordingly, the total number of parameters in Appendix I is now 78 rather than 79 in the 1994 rules.
3. The 2003 rules extend the time period for collecting background data from six months to one year [OAC 3745-27-10(D)(5)(a)(ii) and (b)(ii)]: The 1994 rules allow only six months to collect a minimum of four background samples, while the 2003 rules allow one year to collect a minimum of eight background samples. This is an advantage because some of the commonly used statistical methods (e.g., parametric prediction limits and control charts) require a minimum of eight values in the background data set, and it is usually technically more appropriate to collect eight independent background samples within a period of one year than a period of six months.
4. Assessment is triggered if there is a statistically significant increase in a constituent over background [OAC 3745-27-10(D)(7) and (E)(1)]: Throughout the 2003 rules, the phrase 'significant increase' was amended to 'statistically significant increase.' As a result, the only way to be required to enter assessment is if there is a proven statistical increase. Such other triggers as detectable but unquantifiable evidence of the presence of a man-made chemical can be used voluntarily by the owner or operator but will not create a requirement for assessment.
5. Statistical option added to demonstrate a false positive [OAC 3745-27-10(D)(7)(c)(i)]: The 1 of M resampling method can be used to demonstrate that the statistically significant increase over background was a false positive.
6. Deadline to begin assessment monitoring extended [OAC 3745-27-10(D)(7)(c)(ii)]: Previously, if the owner or operator did not obtain approval to continue detection monitoring with 180 days, assessment monitoring is to begin. This was increased to 210 days.
7. Timeframes to implement the ground water quality assessment program were increased [OAC 3745-27-10(E)(3)]: Previously, the assessment plan was to be submitted within 105 days, this was increased to 135 days.
8. Limited the wells to brought into assessment monitoring [OAC 3745-27-10(E)(5)(a)]: Instead of sampling all background wells for the initial sampling, the owner or operator need only sample the background wells closest to the affected well within the geologic unit affected or within the flow path of the affected well. Instead of sampling all downgradient wells for the initial sampling, the owner or operator need only sample the downgradient wells within the same geologic unit monitored by the affected well.

9. Added the option of a compliance monitoring program [OAC 3745-27-10(E)(8)]: If there is a statistical increase in a non-hazardous constituent (Appendix I parameters 63 through 78), and if the owner or operator implements source controls, instead of entering the corrective measures program, the owner or operator has the option of entering into a compliance monitoring program. The compliance monitoring program is part of the assessment plan, it is self-implementing, and is expected to continue until the end of the post-closure care period, unless it becomes necessary to implement corrective measures.
10. Reporting is decreased [OAC 3745-27-10(E)(12) and (F)(14)]: For the assessment plan and the corrective measures program, the activity reports are no longer submitted quarterly, but semi-annually.
11. Do not have to resubmit documents already submitted [OAC 3745-27-10(E)(12) and (F)(14)]: For the assessment plan and the corrective measures program, documents already submitted do not have to be resubmitted in the reports.

## ATTACHMENT IV

### Added Requirements in 2003 Rules as Compared to 1994 Rules

While there are several benefits to following the 2003 rules compared with the 1994 rules, there are also added requirements worth pointing out. These added requirements are:

1. Assessment is triggered by waste-derived constituents: "Waste-derived" replaced "leachate or leachate-derived" throughout the ground water monitoring rules. "Waste-derived" constituents includes impacts to ground water quality from gas migration, which could not have been addressed through the 1994 rules because the gas was not leachate or leachate-derived. Therefore the facility may enter into assessment under the 2003 rule requirements whereas previously they would not have. Under the previous rules, impacts of gas migration were addressed without determining the rate and extent of the contamination.
2. All reports and data submitted are to be certified by a qualified ground water scientist [OAC 3745-27-10(A)(5)]: Under the 2003 rules, reports and data must be certified by a scientist or engineer who has received a baccalaureate or post-doctorate degree in the natural sciences or engineering and has at least five years relevant experience in ground water hydrology and related fields [see definition of qualified ground water scientist OAC 3745-27-01(Q)].
3. The sampling and analysis plan is to include methods to be used to identify well maintenance problems and process for fixing the problems [OAC 3745-27-10(C)(2)(h)]: The 2003 rules expanded the scope of the sampling and analysis plan to address well maintenance problems.
4. Added requirements for measuring ground water elevations: The 2003 rules added more explicit instructions for measuring ground water elevations. These requirements improve the quality of the data.
  - ⇒ Measure the total depth of the well [OAC 3745-27-10(C)(3)(a)(ii)]: This requirement does not apply if a dedicated pump is used, but does apply if a dedicated pump is pulled from the well.
  - ⇒ Ground water flow is determined more frequently [OAC 3745-27-10(C)(3)(b)]: The ground water flow was previously determined only semi-annually. Under the 2003 rules, it is to be determined semi-annually or whenever more than half the wells in the system are sampled.
5. Added more details to the statistical plan [OAC 3745-27-10(C)(6)]: The 2003 rules have explicit requirements for meeting timeframes to implement and submit changes, and the number of background samples necessary for initial and subsequent statistical analyses.
6. Data from new or replacement wells are to be statistically analyzed as soon as possible [OAC 3745-27-10(D)(5)(e)]: The 1994 rules do not include a requirement to statistically analyze data from new or replacement detection monitoring wells within one year of installation. This is a new requirement under the 2003 rules.
7. Parameters for monitoring the significant zone of saturation were changed [OAC 3745-27-10(D)(5)(b)(i)(a)]: The 2003 rules removed chemical oxygen demand and added benzene, chloroethane, 1,1-dichloroethane, vinyl chloride, and potassium.
8. A corrective measures ground water monitoring plan is required to be submitted with the corrective measures plan [OAC Rule 3745-27-10(F)(2)(e)]: Although owners and operators generally

included provisions for corrective measures ground water monitoring in corrective measures plans under the 1994 rules, there were not any specific requirements for them to do so. The 2003 rules require that corrective measures monitoring wells be sampled semiannually for the contaminants released to ground water and parameters 1 through 66 of Appendix I (the trace metals and volatile organic compounds). Unlike assessment monitoring, owners or operators are not required to perform annual sampling for all Appendix II parameters.