7045.0590 GROUND WATER MONITORING.

Subpart 1. **General requirements.** The owner or operator of a surface impoundment, landfill, or land treatment facility which is used to manage hazardous waste shall implement a ground water monitoring program capable of determining the facility's impact on the quality of ground water in the uppermost aquifer underlying the facility, except as subparts 2 and 3 and part 7045.0552 provide otherwise.

Except as subparts 2, 3, and 5 provide otherwise, the owner or operator shall install, operate, and maintain a ground water monitoring system which meets the requirements of subparts 4 and 5, and must comply with subparts 6, 7, and 8 and part 7045.0592. This ground water monitoring program must be carried out during the active life of the facility, and for disposal facilities, during the postclosure care period as well.

Subp. 2. **Neutralization surface impoundments.** The ground water monitoring requirements of this part and part 7045.0592, may be waived by the commissioner with respect to any surface impoundment that:

A. Is used to neutralize wastes which are hazardous only because they exhibit the corrosivity characteristic under part 7045.0131, subpart 4, or are listed as hazardous wastes in part 7045.0135 only for corrosivity.

B. Contains no other hazardous wastes, if the owner or operator can demonstrate that there is no potential for migration of hazardous wastes from the impoundment. The demonstration must establish, based upon consideration of the characteristics of the wastes and the impoundment, that the corrosive wastes will be neutralized to the extent that they no longer meet the corrosivity characteristic before they can migrate out of the impoundment. This demonstration must be in writing and must be certified by a qualified professional, and submitted to the commissioner for review.

Subp. 3. **Waiving of ground water monitoring requirements.** All or part of the ground water monitoring requirements of this part and part 7045.0592 may be waived if the owner or operator can demonstrate that there is a low potential for migration of hazardous waste or hazardous waste constituents from the facility via the uppermost aquifer to water supply wells including domestic, industrial, or agricultural or to surface water. This demonstration must be in writing, and must be kept at the facility. This demonstration must be certified by a qualified geologist or geotechnical engineer and must establish the following:

A. the potential for migration of hazardous waste or hazardous waste constituents from the facility to the uppermost aquifer, by an evaluation of:

(1) a water balance of precipitation, evapotranspiration, run-off, and infiltration; and

(2) unsaturated zone characteristics including geologic materials, physical properties, and depth to ground water; and

B. the potential for hazardous waste or hazardous waste constituents which enter the uppermost aquifer to migrate to a water supply well or surface water, by an evaluation of:

(1) saturated zone characteristics including geologic materials, physical properties, and rate of ground water flow; and

(2) the proximity of the facility to water supply wells or surface water.

Subp. 4. **Ground water monitoring system.** Requirements of ground water monitoring systems are as follows:

A. A ground water monitoring system must be capable of yielding ground water samples for analysis and must consist of:

(1) At least one monitoring well installed hydraulically upgradient from the limit of the waste management area. Their number, construction, location, and depth must be sufficient to yield ground water samples that are representative of background ground water quality in the uppermost aquifer near the facility, and not affected by the facility; and

(2) At least three monitoring wells installed hydraulically downgradient at the limits of the waste management area. Their number, locations, and depths must ensure that they immediately detect any statistically significant amounts of hazardous waste or hazardous waste constituents that migrate from the waste management area to the uppermost aquifer.

B. Separate monitoring systems for each waste management component of a facility are not required provided that provisions for sampling upgradient and downgradient water quality will detect any discharge from the waste management area.

In the case of a facility consisting of only one surface impoundment, landfill, or land treatment area, the waste management area is described by the waste boundary.

In the case of a facility consisting of more than one surface impoundment, landfill, or land treatment area, the waste management area is described by an imaginary boundary line which circumscribes the several waste management components.

C. All monitoring wells must be cased in a manner that maintains the integrity of the monitoring well bore hole. The hole must be screened and packed with gravel or sand where necessary, to enable sample collection at depths where appropriate aquifer flows exist. Where necessary, wells must be properly developed to enable collection of representative ground water samples. The annular space, meaning the space between the bore hole and the well casing, above the sampling depth must be sealed with a suitable material, such as cement grout or bentonite slurry, to prevent contamination of samples

and the ground water. All monitoring wells must be constructed in accordance with the Minnesota Water Well Construction Code in chapter 4725.

Subp. 5. **Alternate ground water monitoring systems.** If an owner or operator assumes or knows that ground water monitoring of indicator parameters in accordance with subparts 4, items A and B, and 6 would show statistically significant increases, or decreases in the case of pH, when evaluated under item A, he or she may install, operate, and maintain an alternate ground water monitoring system other than the one described in subparts 4 and 6. If the owner or operator decides to use an alternate ground water monitoring system, he or she shall:

A. within one year after July 16, 1984, submit to the commissioner a specific plan, certified by a qualified geologist or geotechnical engineer, which satisfies the requirements of part 7045.0592, subpart 4, item C, for an alternate ground water monitoring system;

B. not later than one year after July 16, 1984, initiate the determinations specified in part 7045.0592, subpart 4, item D;

C. prepare and submit a written report in accordance with part 7045.0592, subpart 4, item E;

D. continue to make the determination specified in part 7045.0592, subpart 4, item D on a quarterly basis until final closure of the facility; and

E. comply with the record keeping and reporting requirements in subpart 7.

Subp. 6. **Sampling and analysis.** The sampling and analysis process is as follows:

A. The owner or operator shall obtain and analyze samples from the installed ground water monitoring system. The owner or operator shall develop and follow a ground water sampling and analysis plan. He or she shall keep this plan at the facility. The plan shall include procedures and techniques for: sample collection, sample preservation and shipment, analytical procedures, and chain of custody control.

B. The owner or operator shall determine the concentration or value of the following parameters in ground water samples in accordance with items C and D:

(1) Parameters characterizing the suitability of the ground water as a drinking water supply, as specified in Code of Federal Regulations, title 40, part 265, appendix III, as amended.

(2) Parameters establishing ground water quality include chloride, iron, manganese, phenols, sodium, and sulfate. These parameters are to be used as a basis for comparison in the event a ground water quality assessment is required under part 7045.0592.

(3) Parameters used as indicators of ground water contamination are pH, specific conductance, total organic carbon, and total organic halogen.

(4) Waste-specific parameters where not covered in item A and subitems (1) to (3) determined by the commissioner as appropriate to the waste managed at the facility.

C. For all monitoring wells, the owner or operator shall establish initial background concentrations or values of all parameters specified in item B quarterly for one year.

For each of the indicator parameters specified in item B, subitem (3), and determined pursuant to item B, subitem (4), at least four replicate measurements must be obtained for each sample and the initial background arithmetic mean and variance must be determined by pooling the replicate measurements for the respective parameter concentrations or values in samples obtained from upgradient wells during the first year.

D. After the first year, all monitoring wells must be sampled and the samples analyzed with the following frequencies:

(1) samples collected to establish ground water quality must be obtained and analyzed for the parameters specified in item B, subitem (2), at least annually; and

(2) samples collected to indicate ground water contamination must be obtained and analyzed for the parameters specified in item B, subitem (3), and determined pursuant to item B, subitem (4), at least quarterly.

E. Elevation of the ground water surface at each monitoring well must be determined each time a sample is obtained.

Subp. 7. **Record keeping.** Unless the ground water is monitored to satisfy the requirements of part 7045.0592, subpart 4, item D, the owner or operator shall keep records of the analyses required in subpart 6, items C and D, the associated ground water surface elevations required in subpart 6, item E, and the evaluations required in part 7045.0592, subpart 2, throughout the active life of the facility, and, for disposal facilities, throughout the postclosure care period as well.

If the ground water is monitored to satisfy the requirements of part 7045.0592, subpart 4, item D, the owner or operator shall keep records of the analyses and evaluations specified in the plan, which satisfies the requirements of part 7045.0592, subpart 4, item C, throughout the active life of the facility, and for disposal facilities, throughout the postclosure care period as well.

Subp. 8. **Reporting.** Reporting requirements are as follows:

A. Unless the ground water is monitored to satisfy the requirements of part 7045.0592, subpart 4, item D, the owner or operator shall report the following ground water monitoring information to the commissioner:

(1) During the first year when initial background concentrations are being established for the facility, the owner or operator shall report concentrations or values of the parameters listed in subpart 6, item B, subitem (1), for each ground water monitoring well within 15 days after completing each quarterly analysis. The owner or operator shall separately identify for each monitoring well any parameters whose concentration or value has been found to exceed the maximum contaminant levels listed in Code of Federal Regulations, title 40, part 265, appendix III, as amended.

(2) The owner or operator shall annually report concentrations or values of the parameters listed in subpart 6, item B, subitem (3) or (4), for each ground water monitoring well, along with the required evaluations for these parameters under part 7045.0592, subpart 2. The owner or operator shall separately identify any significant differences from initial background found in the upgradient wells, in accordance with part 7045.0592, subpart 3. During the active life of the facility this information must be submitted as part of the annual report required under part 7045.0588, subpart 2.

(3) As a part of the annual report required under part 7045.0588, subpart 2, the owner or operator shall report results of the evaluation of ground water surface elevations under part 7045.0592, subpart 6, and a description of the response to that evaluation, where applicable.

B. If the ground water is monitored to satisfy the requirements of part 7045.0592, subpart 4, item D, the owner or operator shall annually, until final closure of the facility, submit to the commissioner a report containing the results of his or her ground water quality assessment program which includes, but is not limited to, the calculated or measured rate of migration of hazardous waste or hazardous waste constituents in the ground water during the reporting period. This report must be submitted as part of the annual report required under part 7045.0588, subpart 2.

Statutory Authority: *MS s 116.07*

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