7045.0532 SURFACE IMPOUNDMENTS.

Subpart 1. **Scope.** This part applies to owners and operators of facilities that use surface impoundments to treat, store, or dispose of hazardous waste, except as part 7045.0450 provides otherwise.

Subp. 2. **Locational requirements.** Locational requirements are as follows:

A. A surface impoundment must not be located in an area characterized by surficial karst features.

B. The owner or operator of a proposed or existing surface impoundment shall submit to the agency with the permit application a hydrogeologic report which provides sufficient information and detail on the site's topography, soils, geology, surface hydrology, and ground water hydrology to evaluate the facility's actual and potential effects on subsoils, surface water, and ground water. This report must include:

(1) a geologic history of the area;

(2) the stratigraphy of the area;

(3) the composition of the site's soil and rock formations;

(4) the hydraulic characteristics of the site's soil and rock formations;

(5) the occurrence of ground water in the area;

(6) directions and rates of ground water and surface water movements;

(7) ground water and surface water interactions;

(8) existing and future uses of ground water and surface water;

(9) existing quality of ground water and surface water;

(10) if a ground water monitoring system which complies with part 7045.0484, subpart 11, item A can be installed at the site;

(11) climatological information; and

(12) all other factors that would influence the quality and mobility of the leachate produced and the potential for it to migrate to subsoils, ground water, or surface water.

C. A surface impoundment, including its underlying liners, must be located entirely above the seasonal high water table.

Subp. 3. **Design and operating requirements.** Design and operating requirements are as follows:

A. A surface impoundment must have a double liner system that is designed, constructed, and installed to prevent migration of waste out of the impoundment to the

adjacent soil or ground water or surface water at any time during the active life, including the closure and postclosure periods, of the impoundment. The double liner system must consist of two liners with a leak detection, collection, and removal system between the liners. This system must be designed, constructed, maintained, and operated to detect, collect, and remove liquids from the space between the liners, without clogging, through the scheduled postclosure care period of the surface impoundment. The liners must conform to the requirements of item B or C, as appropriate, and must be:

(1) constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure due to pressure gradients, including static head and external hydrogeologic forces, physical contact with the waste or leachate to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation;

(2) placed upon a foundation or base capable of providing support to the liner and resistance to pressure gradients above and below the liner to prevent failure of the liner due to settlement, compression, or uplift; and

(3) installed to cover all surrounding earth likely to be in contact with the waste or leachate.

B. For any surface impoundment that is not covered by item C or part 7045.0630, the liners may be constructed of materials that may allow wastes to migrate into the liner, but not into the adjacent subsurface soil or drainage layer or ground water or surface water provided that the impoundment is closed according to subpart 7, item A, subitem (1). For impoundments that will be closed according to subpart 7, item A, subitem (2), at least one liner must be constructed of materials that can prevent wastes from migrating into the liner.

C. The owner or operator of each new surface impoundment unit on which construction commences after January 29, 1992, each lateral expansion of a surface impoundment unit on which construction commences after July 29, 1992, and each replacement of an existing surface impoundment unit that is to commence reuse after July 29, 1992, must install two or more liners and a leachate collection and removal system between such liners. "Construction commences" and "existing facility" are defined in part 7045.0020.

(1) (a) The liner system must include:

i. a top liner designed and constructed of materials (e.g. a geomembrane) to prevent the migration of hazardous constituents into such liner during the active life and postclosure care period; and

ii. a composite bottom liner, consisting of at least two components. The upper component must be designed and constructed of materials (e.g. a geomembrane) to prevent the migration of hazardous constituents into this component during the active

life and postclosure care period. The lower component must be designed and constructed of materials to minimize the migration of hazardous constituents if a breach in the upper component were to occur. The lower component must be constructed of at least three feet (91 centimeters) of compacted soil material with a hydraulic conductivity of no more than 1 x 10 to the negative 7th power centimeters per second.

(b) The liners must comply with item A.

(2) The leachate collection and removal system between the liners, and immediately above the bottom composite liner in the case of multiple leachate collection and removal systems, is also a leak detection system. This leak detection system must be capable of detecting, collecting, and removing leaks of hazardous constituents at the earliest practicable time through all areas of the top liner likely to be exposed to waste or leachate during the active life and postclosure care period. The requirements for a leak detection system in this subitem are satisfied by installation of a system that is, at a minimum:

(a) constructed with a bottom slope of one percent or more;

(b) constructed of granular drainage materials with a hydraulic conductivity of 1 x 10 to the negative 1st power centimeters per second or more and a thickness of 12 inches (30.5 centimeters) or more; or constructed of synthetic or geonet drainage materials with a transmissivity of 3 x 10 to the negative 4th power meters squared per second or more;

(c) constructed of materials that are chemically resistant to the waste managed in the surface impoundment and the leachate expected to be generated, and of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying wastes and any waste cover materials or equipment used at the surface impoundment;

(d) designed and operated to minimize clogging during the active life and postclosure care period; and

(e) constructed with sumps and liquid removal methods (e.g. pumps) of sufficient size to collect and remove liquids from the sump and prevent liquids from backing up into the drainage layer. Each unit must have its own sump. The design of each sump and removal system must provide a method for measuring and recording the volume of liquids present in the sump and of liquids removed.

(3) The owner or operator shall collect and remove pumpable liquids in the sumps to minimize the head on the bottom liner.

(4) The owner or operator of a leak detection system that is not located completely above the seasonal high water table must demonstrate that the operation of the leak detection system will not be adversely affected by the presence of groundwater.

D. A surface impoundment must be designed, constructed, maintained, and operated to prevent overtopping resulting from normal or abnormal operations; overfilling; wind and water action; rainfall; run-on; malfunctions of level controllers, alarms, and other equipment; and human error.

E. A surface impoundment must have dikes that are designed, constructed, and maintained with sufficient structural integrity to prevent massive failure of the dikes. Massive failure of the dikes means any uncontrolled flow of hazardous waste from the surface impoundment. In ensuring structural integrity, it must not be presumed that the liner system will function without leakage during the active life of the unit.

F. The owner or operator of a surface impoundment shall have a method of emptying its wastes in an emergency. Acceptable methods include backup surface impoundments or tanks.

G. The owner or operator of a surface impoundment shall submit to the agency with the permit application a plan for the treatment and disposal of leachate which is removed from the surface impoundment.

H. An owner or operator may petition for alternate design and operating practices under part 7045.0075, subpart 12.

I. The agency shall specify in the permit all design and operating practices that are necessary to ensure that the requirements of items A to H are satisfied.

J. The commissioner shall approve alternative design or operating practices to those specified in item C if the owner or operator demonstrates to the commissioner that such design and operating practices, together with location characteristics:

(1) will prevent the migration of any hazardous constituent into the groundwater or surface water at least as effectively as the liners and leachate collection and removal system specified in item C; and

(2) will allow detection of leaks of hazardous constituents through the top liner at least as effectively.

K. The owner or operator of any replacement surface impoundment unit is exempt from item C if:

(1) the existing unit was constructed in compliance with the design standards of the United States Resource Conservation and Recovery Act, section 3004(o)(1)(A)(i) and (o)(5); and

(2) there is no reason to believe that the liner is not functioning as designed.

Subp. 4. **Leak detection.** If liquids are detected in the leak detection, collection, and removal system, the owner or operator shall notify the commissioner of that fact in writing within seven days after detecting the liquids and:

A. within a period of time specified in the permit, remove accumulated liquids, repair or replace any liner which is leaking to prevent the migration of liquids through the liner, and obtain a certification from a qualified engineer that, to the best of the engineer's knowledge and opinion, the leak has been stopped; or

B. remove accumulated liquids and begin to comply with the monitoring requirements of part 7045.0484, subpart 12, item E within a time specified in the permit. The owner or operator shall continue to remove accumulated liquids from the leak detection, collection, and removal system during the active life and the postclosure care period of the surface impoundment.

C. The agency shall specify in the permit the design and operating practices that are necessary to ensure that the requirements of item A or B are satisfied.

Subp. 4a. **Action leakage rate.**

A. The commissioner shall approve an action leakage rate for surface impoundment units subject to subpart 3, item C or H. The action leakage rate is the maximum design flow rate that the leak detection system can remove without the fluid head on the bottom liner exceeding one foot. The action leakage rate must include an adequate safety margin to allow for uncertainties in the design (e.g., slope, hydraulic conductivity, thickness of drainage material), construction, operation, and location of the leak detection system, waste and leachate characteristics, likelihood and amounts of other sources of liquids in the leak detection system, and proposed response actions (e.g., the action leakage rate must consider decreases in the flow capacity of the system over time resulting from siltation and clogging, rib layover and creep of synthetic components of the system, overburden pressures, etc.).

B. To determine if the action leakage rate has been exceeded, the owner or operator must convert the weekly or monthly flow rate from the monitoring data obtained under subpart 5, item E, to an average daily flow rate (gallons per acre per day) for each sump. Unless the commissioner approves a different calculation, the average daily flow rate for each sump must be calculated weekly during the active life and closure period, and if the unit is closed in accordance with subpart 7, item B, monthly during the postclosure care period when monthly monitoring is required under subpart 5, item E.

Subp. 4b. **Response actions.**

A. The owner or operator of surface impoundment units subject to subpart 3, item C or H, must have an approved response action plan before receipt of waste. The response

action plan must set forth the actions to be taken if the action leakage rate has been exceeded. At a minimum, the response action plan must describe the actions specified in item B.

B. If the flow rate into the leak detection system exceeds the action leakage rate for any sump, the owner or operator must:

(1) notify the commissioner in writing of the exceedence within seven days of the determination;

(2) submit a preliminary written assessment to the commissioner within 14 days of the determination, as to the amount of liquids, likely sources of liquids, possible location, size, and cause of any leaks, and short-term actions taken and planned;

(3) determine to the extent practicable the location, size, and cause of any leak;

(4) determine whether waste receipt should cease or be curtailed, whether any waste should be removed from the unit for inspection, repairs, or controls, and whether or not the unit should be closed;

(5) determine any other short-term and longer-term actions to be taken to mitigate or stop any leaks; and

(6) within 30 days after the notification that the action leakage rate has been exceeded, submit to the commissioner the results of the analyses specified in subitems (3) to (5), the results of actions taken, and actions planned. Monthly thereafter, as long as the flow rate in the leak detection system exceeds the action leakage rate, the owner or operator must submit to the commissioner a report summarizing the results of any remedial actions taken and actions planned.

C. To make the leak and/or remediation determinations in item B, subitems (3) to (5), the owner or operator must:

(1) (a) assess the source of liquids and amounts of liquids by source;

(b) conduct a fingerprint, hazardous constituent, or other analyses of the liquids in the leak detection system to identify the source of liquids and possible location of any leaks, and the hazard and mobility of the liquid; and

(c) assess the seriousness of any leaks in terms of potential for escaping into the environment; or

(2) document why such assessments are not needed.

Subp. 5. **Monitoring and inspection.** Monitoring and inspection requirements are as follows:

A. During construction and installation, liners and cover systems, such as membranes, sheets, or coatings, must be inspected for uniformity, damage, and

imperfections, such as holes, cracks, thin spots, or foreign materials. Immediately after construction or installation and for liners prior to the placement of waste into the impoundment:

(1) synthetic liners and covers must be inspected to ensure tight seams and joints and the absence of tears, punctures, or blisters;

(2) soil-based and admixed liners and covers must be inspected for imperfections including lenses, cracks, channels, root holes, or other structural nonuniformities that may cause an increase in the permeability of the liner or cover; and

(3) the owner or operator shall conduct a water balance test which demonstrates that the liner system is functioning as designed.

The agency shall specify in the permit acceptable methods of liner and cover inspection and the method and duration of the water balance test.

B. While a surface impoundment is in operation, it must be inspected weekly and after storms to detect evidence of any of the following:

(1) deterioration, malfunctions, or improper operation of overtopping control systems;

(2) drops in the level of the impoundment's contents;

(3) the presence of liquids in leak detection, collection, and removal systems; and

(4) severe erosion or other signs of deterioration in dikes or other containment devices.

If evidence of a condition described in subitems (1) to (4) is detected, the owner or operator shall immediately notify the commissioner of the condition and remedies to correct the condition.

C. Prior to the issuance of a permit, and after any extended period of time, at least six months, during which the impoundment is not in service, the owner or operator of an existing surface impoundment shall obtain a certification from a qualified engineer that the impoundment's dike, including that portion of any dike which provides freeboard, has structural integrity. For a new surface impoundment, the owner or operator shall obtain the certification upon completion of construction in accordance with the plans and specifications, prior to the placement of waste into the impoundment. The certification must establish, in particular, that the dike:

(1) will withstand the stress of the pressure exerted by the types and amounts of waste to be placed in the impoundment; and

(2) will not fail due to scouring or piping, without dependence on any liner system included in the surface impoundment construction.

D. Prior to the issuance of a permit, after any dredging activities, and after any extended period of time, at least six months, during which the impoundment is not in service, the owner or operator shall obtain certification from a qualified engineer that the uppermost liner and the leak detection, collection, and removal system is intact and remains at design specifications. For a new surface impoundment, the owner or operator shall obtain the certification upon completion of construction in accordance with the plans and specifications, prior to the placement of waste into the impoundment. This certification must address both liners.

E. Leak detection system sump monitoring.

(1) An owner or operator required to have a leak detection system under subpart 3, item C or H, must record the amount of liquids removed from each leak detection system sump at least once each week during the active life and closure period.

(2) After the final cover is installed, the amount of liquids removed from each leak detection system sump must be recorded at least monthly. If the liquid level in the sump stays below the pump operating level for two consecutive months, the amount of liquids in the sumps must be recorded at least quarterly. If the liquid level in the sump stays below the pump operating level for two consecutive quarters, the amount of liquids in the sumps must be recorded at least semiannually. If at any time during the postclosure care period the pump operating level is exceeded at units on quarterly or semiannual recording schedules, the owner or operator must return to monthly recording of amounts of liquids removed from each sump until the liquid level again stays below the pump operating level for two consecutive months.

(3) "Pump operating level" is a liquid level proposed by the owner or operator and approved by the commissioner based on pump activation level, sump dimensions, and level that avoids backup into the drainage layer and minimizes head in the sump.

Subp. 6. **Emergency repairs, contingency plans.** Emergency repairs and contingency plans are as follows:

A. A surface impoundment must be removed from service in accordance with item B if:

(1) the level of liquids in the impoundment drops and the drop is not known to be caused by changes in the flows into or out of the impoundment; or

(2) the dike leaks.

B. If a surface impoundment must be removed from service as required by item A, the owner or operator shall:

(1) immediately shut off the flow or otherwise stop the addition of wastes into the impoundment;

(2) immediately contain any surface leakage which has occurred or is occurring;

(3) immediately stop the leak;

(4) take any other necessary steps to stop or prevent catastrophic failure;

(5) if a leak cannot be stopped immediately by any other means, empty the impoundment; and

(6) notify the commissioner of the problem immediately by telephone and submit a report in writing within seven days after detecting the problem. The report must discuss the problem and the remedial actions taken and their effects.

C. As part of the contingency plan required in part 7045.0466 the owner or operator shall specify a procedure for complying with the requirements of item B.

D. No surface impoundment that has been removed from service in accordance with the requirements of items A to C may be restored to service unless the portion of the impoundment which was failing is repaired and the following steps are taken:

(1) If the impoundment was removed from service as the result of actual or imminent dike failure, the dike's structural integrity must be recertified in accordance with subpart 5, item C.

(2) If the impoundment was removed from service as the result of a drop in the liquid level, the repaired liner system must be certified by a qualified engineer as meeting the design specifications approved in the permit.

E. A surface impoundment that has been removed from service in accordance with the requirements of items A to C and that is not being repaired must be closed according to subpart 7.

Subp. 7. **Closure and postclosure care.** The requirements of closure and postclosure care are as follows:

A. At closure, the owner or operator shall:

(1) remove or decontaminate all waste residues, contaminated containment system components including liners, contaminated subsoils, and structures and equipment contaminated with waste and leachate, and manage them as hazardous waste unless they are shown to not be hazardous in accordance with parts 7045.0102 to 7045.0155; or

(2) eliminate free liquids by removing liquid waste or solidifying the remaining waste and waste residues; stabilize remaining wastes to a bearing capacity sufficient to support final cover; and provide a final cover over the surface impoundment. The final cover must be designed and constructed to provide long-term minimization of the migration of liquids through the closed impoundment, function with minimum maintenance, promote drainage and minimize erosion or abrasion of the final cover, accommodate settling and subsidence so that the cover's integrity is maintained, and have a permeability less than or equal to the permeability of any bottom liner system.

B. If waste residues or contaminated materials are left in place at final closure, the owner or operator shall comply with the postclosure requirements contained in parts 7045.0490 to 7045.0496, including maintenance and monitoring throughout the postclosure care period specified in the permit under part 7045.0490. The owner or operator shall:

(1) maintain the integrity and effectiveness of the final cover, including making repairs to the cap as necessary to correct the effects of settling, subsidence, erosion, or other events;

(2) maintain and monitor the leak detection system in accordance with subparts 3, item C, subitems (3), unit (d), and (4); and 5, item E, and comply with all other applicable leak detection system requirements;

(3) maintain and monitor the leak detection system in accordance with subparts 3 and 4;

(4) maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of part 7045.0484; and

(5) prevent run-on and runoff from eroding or otherwise damaging the final cover.

C. If an owner or operator plans to close a surface impoundment in accordance with item A, subitem (1) and the impoundment does not comply with the liner requirements of subpart 3, item A, then:

(1) the closure plan for the impoundment under part 7045.0486 must include both a plan for complying with item A, subitem (1) and a contingent plan for complying with item A, subitem (2) in case not all contaminated subsoils can be practicably removed at closure; and

(2) the owner or operator shall prepare a contingent postclosure plan under part 7045.0490 for complying with item B if not all contaminated subsoils can be practicably removed at closure.

D. The cost estimates calculated under parts 7045.0502 and 7045.0506 for closure and postclosure care of an impoundment subject to item C must include the cost of

complying with the contingent closure plan and the contingent postclosure plan, as well as the cost of expected closure under item A, subitem (1).

E. During the postclosure care period, if liquids are detected in a leak detection, collection, and removal system, the owner or operator shall:

(1) notify the commissioner of that fact in writing within seven days after detecting the liquids; and

(2) remove accumulated liquids and begin to comply with the monitoring requirements of part 7045.0484, subpart 12, item E within a time specified in the permit.

Subp. 8. **Special requirements for ignitable or reactive waste.** Ignitable or reactive waste must not be placed in a surface impoundment, unless the waste and impoundment satisfy all applicable requirements of part 7045.1390, and:

A. the waste is treated, rendered, or mixed before or immediately after placement in the impoundment so that the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under part 7045.0131, subparts 2 and 5, and compliance with part 7045.0456, subpart 2 is maintained;

B. the waste is managed in such a way that it is protected from any material or conditions which may cause it to ignite or react; or

C. the surface impoundment is used solely for emergencies.

Subp. 9. **Special requirements for incompatible wastes.** Incompatible wastes, or incompatible wastes and materials, must not be placed in the same surface impoundment unless compliance with part 7045.0456, subpart 2 is maintained. For examples of potentially incompatible wastes, or incompatible waste and materials, see part 7045.0543, subpart 1, item C.

Subp. 10. **Special requirements for hazardous wastes F020, F021, F022, F023, F026, F027, and F028.** The following requirements apply to the hazardous wastes indicated:

A. Hazardous waste F020, F021, F022, F023, F026, and F027 listed under part 7045.0135, subpart 1a, item B, must not be placed in a surface impoundment.

B. Hazardous waste F028 and treatment residues and soils contaminated with hazardous wastes F020, F021, F022, F023, F026, F027, and F028 listed under part 7045.0135, subpart 1a, item B, must not be placed in surface impoundments unless the owner or operator operates the surface impoundment in accordance with all applicable

requirements of this part and in accordance with a management plan that is approved by the commissioner considering the following factors:

(1) the volume, physical, and chemical characteristics of the wastes, including their potential to migrate through soil or to volatilize or escape into the atmosphere;

(2) the attenuative properties of underlying and surrounding soils or other materials;

(3) the mobilizing properties of other materials codisposed with these wastes; and

(4) the effectiveness of additional treatment, design, or monitoring techniques.

C. The commissioner shall impose additional design, operating, and monitoring requirements if the commissioner finds that additional requirements are necessary for surface impoundments used to treat, store, or dispose of hazardous waste F028 and treatment residues and soils contaminated with hazardous wastes F020, F021, F022, F023, F026, F027, and F028 listed under part 7045.0135, subpart 1a, item B, in order to reduce the possibility of migration of these wastes to ground water, surface water, or air so as to protect human health and the environment.

Subp. 11. **Air emission standards.** The owner or operator must manage all hazardous waste placed in a surface impoundment in accordance with parts 7045.0540 and 7045.0551.

Statutory Authority: *MS s 116.07; 116.37*

History: *9 SR 115; 10 SR 1212; L 1987 c 186 s 15; 15 SR 1877; 16 SR 2102; 16 SR 2239; 17 SR 1279; 18 SR 1565; 18 SR 1886; 33 SR 2042*

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