(Translation)

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Notification of the Ministry of Public Health

Specifications and Conditions for Protection of Underground Water from Contamination by Leachate and Reporting of Underground Water Assessment

B.E.2560 (A.D.2017)

Whereas it is deemed expedient to prescribe specifications and conditions for the protection of underground water from contamination by leachate in order for landfill designs and construction works to appropriately and effectively protect underground water from contamination by leachate and to assess underground water quality and contamination at sanitary landfills without causing any impact to health and environment.

By virtue of the provision of Clause 23 (3) and (8) of the Ministerial Regulation on General Waste Management B.E.2560 (A.D.2017), the Minister of Public Health issues the Notification as follows.

Clause 1. This Notification shall be referred to as "Specifications and Conditions for Protection of Underground Water from Contamination by Leachate and Reporting of Underground Water Assessment B.E.2560 (A.D.2017)".

Clause 2. This Notification shall come into force one hundred eighty days following that of its promulgation in the Government Gazette.

Clause 3. In this Notification,

"protection of underground water from contamination by landfill leachate" means designs, construction works and operation of any sanitary landfill that prevent leachate migration to the ground and underground water;

"liner" means natural materials or synthetic materials which are intended to be a low permeable barrier. These materials are laid down under and on the walls of landfill sites, including leachate treatment ponds. The materials are such as clay, High Density Polyethylene (HDPE), Geosynthetic Clay Liner (GCL), etc.

"monitoring well" means a well that is particularly designed and built for underground water contamination assessment of which the diameter is not less than 4 inches. The well

should be installed in a proper location in order to collect water samples for quality assessment as the underground water can be contaminated by leachate.

“underground water” means the water present beneath the ground, which also includes groundwater in accordance with the Groundwater Act.

Clause 4. Design and construction of sanitary landfills must consider prevention of leachate contamination in soil and groundwater by utilizing liners of which specifications are in line with engineering principles and the condition is vulnerable to damage that may occur. The damage includes corrosion caused by leachate, active forces from leachate, fluid pressure, etc.

During the construction works and prior to the activation of a landfill system, there shall be an assessment of system quality from time to time, which includes assessment of material standards, quality assessment of construction and installation i.e. base compaction, liner construction, connection between liner and pipe systems, etc. This also includes system testing and cleaning of the leachate collection system.

Clause 5. Liners must be placed on the ground or the base of which the geological conditions are vulnerable to waste pressure. The liners must cover all areas of the ground that make a direct contact to the waste or leachate. This can be operated as follows.

(1) A landfill site must be installed with a liner system to cover all areas that have a direct contact to waste or leachate in order to prevent migration of leachate. The liner system is consisting of compacted clay liner, geomembrane and leachate collection system respectively from the bottom. The details are elaborated as follows.

(1.1) The compacted clay liner or the original soil which has been compacted much enough to be able to support engineering subsidence and stable to support leachate. This layer must be free from rocks, stones or other substances that may damage the liner.

(1.2) On the liner layer, the bottom and the walls of the landfill must be built from clay of which the leakage rate must not exceed 1×10^{-5} centimeters per second and the width must not less than 60 centimeters, or built from Geosynthetic Clay Liner (GCL) of which the qualifications are equivalent or better than the former mentioned clay. It must be overlain by High Density Polyethylene (HDPE) of which the width is from 1.5 millimeters and the leakage rate does not exceed 1×10^{-12} centimeters per second and once again overlain by Geotextiles of which the qualifications are met to prevent tear of High Density Polyethylene (HDPE) from the pressure of waste, waste-cover materials and machinery work during landfill operation. The slope of the landfill site is defined to be sufficient for water drainage after being overlain by layers and is stable in accordance with engineering principles.

(1.3) Leachate collection system is a layer of rough sand of which the leakage rate is not less than 1×10^{-3} centimeters per second and the width is 50 centimeters. This layer will transfer leachate to the monitoring pond or leachate treatment system. The sand layer is consisting of leachate collection system and leachate pumping system for treatment and clog clearance. The details are as follows.

(a) The leachate collection system is consisting of leachate collection pipe and monitoring pond. The main leachate collection pipe is made of Polyethylene (PE) or High Density Polyethylene (HDPE) of which the diameter is not less than 6 inches and is vulnerable to pressure of waste. For the branches of leachate collection pipes, there shall be holes of which the size, number and distance between each one sufficiently allow migration of leachate and maintain fluid pressure above the liner to be within 30 centimeters comparing to the height of water. The drilled holes must not have any effect to the strength quality of the pipe as it needs to be vulnerable to the pressure of waste management. The slope of the landfill site is defined to be sufficient for water drainage after being overlain by layers and is stable in accordance with engineering principles.

(b) leachate pumping system for treatment and clog cleansing is composed of a monitoring pond or vertical pipe paralleling to the wall of the landfill. The function of this system is to collect leachate from the leachate collection system with design and well-built construction to support active forces from the landfill process. The leachate pumping system must be installed sufficiently to support the leachate amount. The design and construction of clog cleansing system in the leachate collection pipe must be sufficient. Follow-ups and maintenance services at least one time per year are required. This also includes assessment and removal of clog from the leachate collection pipe.

(2) Leachate treatment system must be designed and installed based on the following standards.

(2.1) The size of the pond must be large enough to collect leachate and rain water that falls to the pond. Its ground and walls must be built from clay of which the leakage rate must not exceed 1×10^{-5} centimeters per second and the thickness is not less than 60 centimeters, or built from Geosynthetic Clay Liner (GCL) of which the quality is equivalent to or better than the formerly mentioned clay and overlaid by High Density Polyethylene (HDPE), with the thickness from 1.5 millimeters, and the leakage rate does not exceed 1×10^{-12} centimeters per second.

(2.2) There shall be a leachate treatment system and wastewater control for leachate before being drained out from landfills. The results must not exceed the standards of wastewater prescribed in related laws.

Clause 6. The general landfill assessment must be conducted at least one time per year. This must include assessment and clog cleansing of leachate collection pipes.

Clause 7. At least 3 monitoring wells must be installed in order to assess quality of groundwater. This shall be composed of 1 reference well and 2 monitoring wells. All 3 wells must be laid in the same direction of the groundwater flow. More than 1 of the reference wells shall be in the position above the water or in an up-gradient of groundwater that flows through the landfill. The distance between each well that is perpendicular to the flow of groundwater must not exceed 150 meters. Groundwater collection and quality assessment shall be in accordance with laws on environmental promotion and preservation.

The installation of monitoring wells described in paragraph one shall consider the depth of the well from the groundwater level. The depth must be deep enough to allow sufficient groundwater for groundwater sample collection. In the case that the landfill is deeper than the first layer of water level, another set of monitoring well should be installed.

Clause 8. Prescribing to have a report on assessment of groundwater in the area of landfills, collection and analysis shall follow up for at least 2 times a year, covering the rainy season and the dry season in order for the corresponding agencies to have assessment at all times. The details for the operation are as follows.

(1) provide a map indicating sample collection site with scale, groundwater level, flow direction of groundwater level and the location of monitoring wells.

(2) prescribing that a sample must be collected for groundwater quality analysis. This collection is required at least twice a year before and during construction works of a landfill and twice a year after closing down of a sanitary landfill. The quality analysis of the closed down sites shall be conducted for 10 consecutive years.

Announced on the 30th day of November 2017

Piyasakol Sakolsattayatorn

The Minister of Public Health