FINAL

SUBJECT: Significant Zone of Saturation [OAC Rule 3745-27-01(RR)]

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REVISED:

PURPOSE: To provide guidance and examples for interpreting the definition of significant zone of saturation as contained in OAC Rule 3745-27-01(RR).

BACKGROUND: OAC Rule 3745-27-01(RR) defines significant zone of saturation as "a zone of saturation that may act as a preferential pathway of migration away from the limits of solid waste placement." The definition was created to aid in identifying the zones of saturation that must be monitored for possible releases of leachate from a sanitary landfill facility (SLF). Many questions have been raised concerning interpretation of the definition. This document establishes the meaning of the definition and provides examples for identification of significant zones of saturation.

GUIDANCE: A significant zone of saturation is a hydrogeologic unit in the zone of saturation that possesses certain hydraulic properties that allow it to transmit ground water and contaminants at a faster rate than surrounding geologic units. It must occur adjacent to or beneath a SLF's area of solid waste placement and should posses a hydraulic gradient that transmits contaminants away from the limits of solid waste placement. These zones do not have to be capable of yielding a significant amount of water to a well or developed spring.

Two examples of significant zones of saturation are shown in Figures 1 and 2. Figure 1 shows a clay till with the presence of a narrow sand seam. The uppermost aquifer system is the bedrock aquifer located beneath the clay till. The hydraulic conductivity (K) of the clay till is 1×10^{-8} centimeters per second (cm/sec) while that of the sand seam is 1×10^{-3} cm/sec. Due to the differences in hydraulic conductivities between the till and the sand seams, ground water will flow much faster (under equal hydraulic gradients) through the sand seam than the clay till. Therefore, the sand seam meets the definition for a significant zone of saturation.

In Figure 2, there is a narrow fractured sandstone formation between two shale formations. These formations are within the zone of saturation. The fractured sandstone is not an aquifer system. The fractured sandstone has a hydraulic conductivity of 1×10^{-4}, while the shale units have hydraulic conductivities of 1×10^{-6}. Due to the differences in hydraulic conductivities, ground water will flow faster (under equal hydraulic gradients) through the fractured sandstone than the shale units. Therefore, the sandstone meets the definition for a significant zone of saturation.

In conclusion, a significant zone of saturation is a saturated geologic unit that, due to its hydrogeologic properties in relation to the surrounding geologic units, acts as a preferential pathway of migration. To be a significant zone of saturation, the unit must be located physically so as to act as a potential pathway for contaminant migration away from an SLF's area of waste placement.

FIGURE 1

Case where sand seam acts as significant zone of saturation

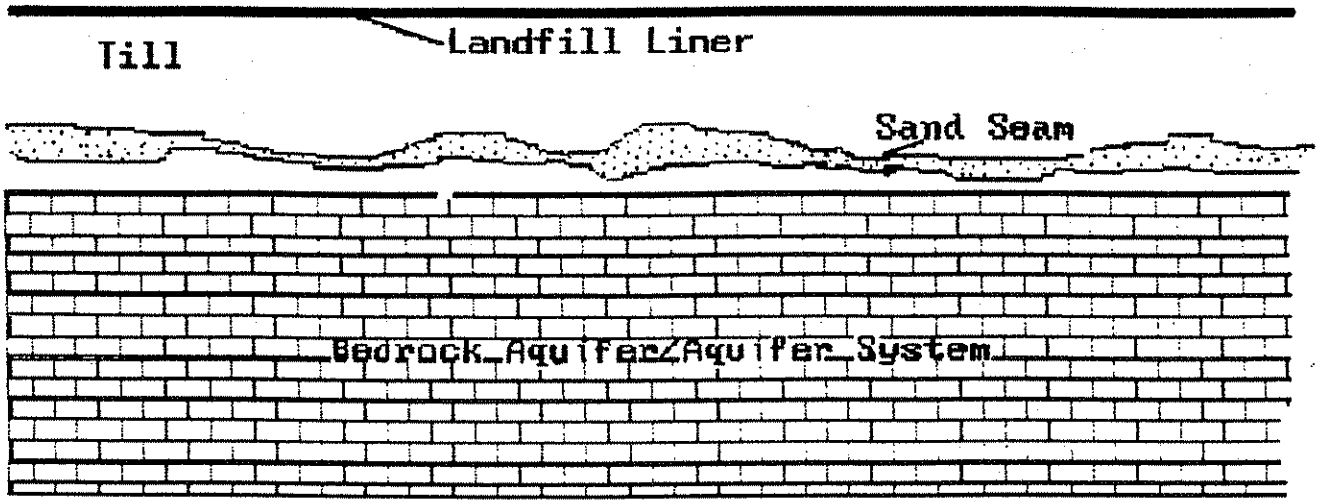
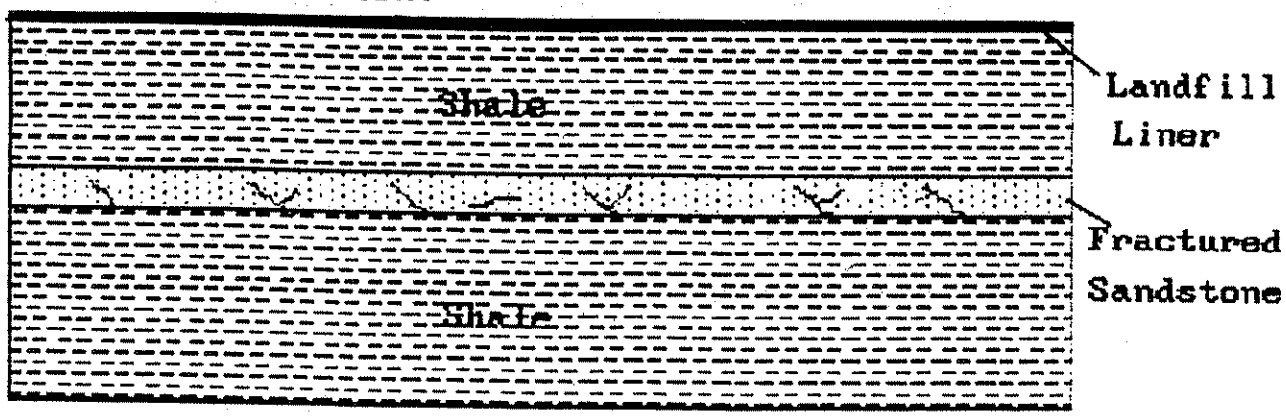


FIGURE 2

Case where fractured sandstone acts as significant zone of saturation.