Technical Bulletin on Addressing Soil Saturation Limit (C_{sat})

What is C_{sat}?

As outlined in 35 Ill. Adm. Code 742.200, Soil Saturation Limit or C_{sat} means the contaminant concentration at which the absorptive limits of the soil particles, the solubility limits of the available soil moisture, and saturation of pore air have been reached. Above the soil saturation concentration, the assumptions regarding vapor transport to air and/or dissolved phase transport to groundwater (for chemicals that are liquid at ambient soil temperatures) do not apply, and alternative modeling approaches are required.

In accordance with 35 Ill. Adm. Code 742.300(b) and 742.305(b), no exposure route may be excluded from consideration until the vertical and horizontal extents of any organic contaminants of concern remaining in the soil have been defined and the concentrations of any contaminants of concern remaining in the soil have been shown to meet the C_{sat} as determined under 35 Ill. Adm. Code 742.220(c). The C_{sat} for individual contaminants are listed in 35 Ill. Adm. Code 742.Appendix A, Table A. In addition, a site-specific C_{sat} may be calculated using Equation S29 in 35 Ill. Adm. Code 742.Appendix C, Table A. C_{sat} requirements apply only to individual contaminants with a melting point less than 30^0C. The melting points of polynuclear aromatic hydrocarbons (PNAs) are not less than 30^0C as outlined in 35 Ill. Adm. Code Section 742.220; therefore, C_{sat} requirements do not apply to PNAs.

How to address C_{sat} exceedances?

Exceedances of the soil saturation limit for any organic contaminant, as determined under 35 Ill. Adm. Code 742.220, must be addressed prior to excluding an exposure route, and characterization of the extent and concentrations of contaminants of concern at a site must be performed prior to exclusion of any exposure route, as required by Section 742.305(b).

If the plume exceeding C_{sat} is clearly defined and confined within the unsaturated zone, then the C_{sat} must be considered as a soil issue, and corrective action strategies must be developed, as applicable. However, if it has been adequately demonstrated that the soil contamination exceeding the C_{sat} will remain fully within the saturated zone, then the C_{sat} must be addressed as groundwater issue per program requirements in accordance with 35 Ill. Adm. Code 742.300(b) and C_{sat} may be excluded from consideration as a soil issue.

How to adequately demonstrate the C_{sat} in the saturated zone?

A minimum of four (4) consecutive quarters of static groundwater elevation data must be collected to make the demonstration that soil contamination exceeding the C_{sat} is consistently within the saturated zone. Monitoring wells must be installed where the soil contamination exceeding the C_{sat} is most likely to be present, with the wells screened across the depth of contamination exceeding C_{sat}. If it has been adequately demonstrated that the soil contamination exceeding the C_{sat} will remain fully within the saturated zone, the groundwater ingestion exposure route may be excluded pursuant to 35 Ill. Adm. Code 742.320.

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