TITLE: **Separation Distance Between Source Area(s) and Ground Water**

DATE EFFECTIVE: January 2003

HISTORY: Update of VA30007.09.018 - Revision was necessary to reflect changes in the rule citations that became effective in August 2014.

KEYWORDS: Separation distance, source areas, protection of ground water

RULE/ AUTHORITY: OAC 3745-300-07(F)(3) and (F)(4); and 3745-300-10(D)

QUESTION: How much separation distance between source area(s) (as defined in OAC 3745-300-01) and ground water is necessary when applying a weight-of-evidence approach to demonstrate that a ground water zone:

1. Meets unrestricted potable use standards (UPUS) in accordance with OAC 3745-300-07(F)(3); or
2. Will continue to meet UPUS in accordance with OAC 3745-300-07(F)(4)?

ANSWER: The decision on whether a ground water zone meets UPUS or will continue to meet UPUS **cannot be based solely on separation distance.** Separation distance must be evaluated along with the other criteria listed in OAC 3745-300-07(F)(3)(b) or (F)(4)(a)(ii) (see Background Section). The mass, persistence, partitioning coefficient (K_{oc}), specific gravity and solubility of the COCs; the type of subsurface soil/bedrock; the secondary features in the subsurface, and man-made structures will influence the mobility of a contaminant. For example, modeling has shown that polycyclic aromatic hydrocarbons (PAHs) may not impact shallow ground water even at soil saturation concentrations. In contrast, low levels of more mobile contaminants, such as trichloroethylene and benzene, may impact deep ground water zones. Therefore, mobile contaminants may require a quantitative assessment.

In most cases, the soil type and vertical hydraulic conductivity will be needed in order to determine if the material will attenuate contaminant migration. If there is more than one soil type found at the property, a depth-weighted average of vertical hydraulic conductivities can be used to determine the ability of the soil to attenuate contaminant migration. Other soil characteristics that may assist the volunteer to

determine the ability of the soil to attenuate contaminants include: bulk density, soil *p*H, mineral content, fraction of organic carbon, and cation exchange capacity.

When an upper ground water zone exceeds UPUS, flow gradients between the upper zone and the next lower ground water zone may be needed to determine whether lower ground water zones meet or will continue to meet UPUS.

Engineering controls may also influence the mobility of contaminants. If an engineering control(s) is utilized, an operation and maintenance (O&M) plan must be developed and, for properties requesting a cotenant not to sue, an O&M agreement is required to ensure that the control(s) will be maintained.

Separation Distance: As indicated above, the minimal separation distance is highly dependent on the type of soil and on the characteristics and concentrations of the contaminant.

This separation distance should also consider seasonal fluctuations in the ground water table.

- Depending on the level and type of contaminants, a weight-of-evidence demonstration that ground water meets UPUS or will continue to meet UPUS may be reasonable if **at least** 30 feet of clay to clayey silt exists between the deepest known source area and the ground water zone being protected. As discussed above, more mobile contaminants may require a quantitative assessment.

- A weight-of-evidence demonstration that the ground water meets UPUS or will not be impacted by source areas on or beneath the property generally is **not** acceptable when the separation distance between the deepest known source area and the ground water zone being protected **is less than 15 feet**. An exception to this **may be** when the material is clay to clayey silt and the chemicals of concern are metals or highly immobile organics (e.g., heavy metals and PAHs). If the separation distance at the VAP property is less than 15 feet and the CP believes an exception to this recommendation is warranted, the CP/Volunteer may want to consider contacting the VAP for technical assistance.

BACKGROUND: OAC 3745-300-01 defines source area as any abandoned or discarded barrels, containers or any other closed receptacle in environmental media, or any affected media originally impacted by a release from which contamination is acting, has acted or has the potential to act as a point of

origin for the migration of the release throughout the environment.

The rule lists criteria that must be considered when using a weight-of-evidence approach to demonstrate that a ground water zone meets UPUS in accordance with OAC 3745-300-07(F)(3)(b) or will continue to meet UPUS in accordance with OAC 3745-300-07(F)(4)(a)(ii). This includes:

The nature, type, concentration, and mass of COCs released, and the time of release (OAC 3745-300-07(F)(3)(b)(i) and (F)(4)(a)(ii)(a)).

Contaminant, type, and concentration, and mass of COCs present in the subsurface soil or bedrock above the saturated zone requiring protection or between ground water zones (OAC 3745-300-07(F)(3)(b)(ii) and (F)(4)(a)(ii)(b)).

The physical and chemical characteristics of the soil or bedrock beneath the property including, but not limited to, the secondary features, soil or bedrock type, heterogeneity of the subsurface soil or bedrock, or the integrity of any confining layers separating ground water zones (OAC 3745-300-07(F)(3)(b)(iii) and (F)(4)(a)(ii)(c));

Separation distance between the source and ground water or the separation distance between ground water zones (OAC 3745-300-07(F)(3)(b)(iv) and (F)(4)(a)(ii)(d)):

Results of modeling conducted in accordance with rule requirements on use of modeling in accordance with OAC 3745-300-07(G) (OAC 3745-300-07(F)(3)(b)(v) and (F)(4)(a)(ii)(e)).

The presence or absence of off-property sources that may have impacted the ground water on, underlying, or emanating from the property (OAC 3745-300-07(F)(3)(b)(vi)).

The presence of man-made structures on the property that reduce or prevent infiltration and leaching of any COC to the ground water zone (OAC 3745-300-07(F)(4)(a)(ii)(f)).

Any other lines of evidence the volunteer believes support the determination that the ground water in a zone underlying a property will not exceed concentrations of any chemical of concern above UPUS (OAC 3745-300-07(F)(3)(b)(vii) and (F)(4)(a)(ii)(g)).

SUMMARY: The decision on whether a ground water zone meets UPUS or will continue to meet UPUS cannot be based solely on separation distance. The separation distance needed to ensure protectiveness of ground water is highly dependent on the type and nature of chemicals of concern at the property, and the type of subsurface soils.

OHIO EPA CONTACT: For any questions concerning this issue, please contact the VAP central office at (614) 644-2924 or DDAGW-VAP Support Staff at (614) 644-2752.