

**ARCHIVE:** Archived to revise and clarify the guidance within the document (technical content remains accurate). Refer to VA30007.03.004 for the updated document.

## OHIO EPA

### DIVISION OF EMERGENCY AND REMEDIAL RESPONSE VOLUNTARY ACTION PROGRAM

# FREQUENTLY ASKED QUESTION #1: Definition of Saturated Zone

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#### PURPOSE

This series of fact sheets is intended to provide guidance regarding the Agency's position concerning the interpretation of certain Voluntary Action Program (VAP) rule requirements. The information provided within these documents is based upon Agency evaluation of several VAP no further action letters submitted with the intent of obtaining a covenant not to sue as well as assistance provided for several VAP technical assistance projects.

#### QUESTION

How should the definition for "**saturated zone**" be interpreted?

#### BACKGROUND

The interpretation of "**saturated zone**" is important to the application of the VAP ground water protection, classification, and response requirements. In Ohio Administrative Code (OAC) 3745-300-10(A)(4), ground water is defined as water underlying a property in a "**saturated zone**" that can yield at least 1.5 gallons within eight hours of purging and has an in-situ hydraulic conductivity greater than  $5 \times 10^{-6}$  cm/sec. The term "saturated zone" is also used numerous times in the rules for ground water classification (OAC 3745-300-10(C)). Finally, under OAC 3745-300-10(E), when any ground water occurring in a "**saturated zone**" underlying the property complies with VAP unrestricted potable use standards (UPUS), remedial activities must ensure that migration of hazardous substances or petroleum will not result in UPUS being exceeded anywhere within the saturated zone.

**“Saturated Zone”** is defined in OAC 3745-300-10(A)(5) as a part or layer of the earth’s crust, excluding the capillary zone, in which all voids are filled with water. Two key elements of this definition are “parts of the earth’s crusts” and “all voids filled with water.” Thus, the interpretation of a saturated zone relies on an understanding of these elements.

## **ANSWER**

### **Parts or Layers of the Earth’s Crust**

“Part or layer of the earth’s crust” is considered to be geologic material that is of overall similarity with respect to type and character and is distinctly different from overlying, underlying, or surrounding materials. Type and character includes, but is not limited to, grain size, horizontal and vertical hydraulic conductivity, and material type, with hydraulic conductivity receiving most weight.

A “part or layer of the earth’s crust” may contain isolated seams of dissimilar material that are not thick or extensive and do not serve as a preferential pathway off-property. For example, fine-grained materials (clays and clayey silts) with isolated pockets or lenses of coarser-grained material can be considered one part or layer as long as one of the pockets or lenses is not a potential pathway off of the property. Whether seams are isolated can be determined from exploratory borings that are sufficient in number, depth, location and sampling.

The interpretation of “part or layer of the earth’s crust” does not address hydraulic interconnection between saturated materials. In situations where two distinct “parts or layers” are hydraulically interconnected, they should be considered separate zones for the VAP. For example, if an upper sand and gravel is separated from a lower sand and gravel by a leaky clay confining layer, the two permeable units should be evaluated separately. However, in the case where a coarse sand and gravel directly overlies and is in direct hydraulic connection with a high yielding fractured bedrock aquifer, the two units should be considered one “part or layer”.

### **All Voids Filled With Water**

Seasonably saturated materials can serve as preferential pathways. A “part or layer” is a “saturated zone” if there is saturation during a significant part of the year (3 to 6 months). Saturation that only occurs as a wetting front after precipitation events should not be considered significant.

If the decision on whether a zone is not saturated is based on one sampling event that is not during the time of year when water levels are highest, then the determination must be supported with information that would indicate the saturated

conditions would not be expected during other times of the year. The evaluation, at a minimum, should include:

- Areal extent of the zone
- Evaluation of local precipitation data
- Geologic/hydrogeologic data from surrounding areas

If the above data indicate that saturated zones may be present during other times, then it is recommended that field analysis include additional testing such as direct push sampling wells or water level measurement in piezometers for at least the next three to six months (two quarters of data are preferred).

To determine if a seasonally saturated zone has ground water under OAC 3745-300-10(A)(4), a volunteer can, under OAC 3745-300-07(D)(6)(a)(i), show that the zone cannot sustain a statistical average yield of 1.5 gallons in 8 hours through a 12 month period. If this can be demonstrated, then the zone would not be considered ground water per the rule. Testing should be conducted a minimum of 4 times throughout the year (to achieve an adequate seasonal distribution). Dry wells and wells that remain dry after 8 hours of purging should be averaged in as zero yield. The volunteer also has the option of evaluating whether the perched zone is ground water by biasing the yield to times of highest yield (OAC 3745-300-07(D)(6)(a)(ii)). Since the months of March, April and May generally represent the wettest season, if the perched zone cannot sustain 1.5 gallons in 8 hours during those months, then the water in the perched zone would not be considered ground water. Information demonstrating that the testing event is biased to times of highest yield should be supported by historical and current climatological data.