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| SUBJECT: Criteria to Eliminate the Potable Groundwater Pathway | DATE: August 25, 1997 | Operational Memorandum No. 11 |
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Introduction

Part 213, Leaking Underground Storage Tanks (LUST), of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, requires all exposure pathways and receptors to be evaluated based upon site conditions and characteristics utilizing the Risk-Based Corrective Action (RBCA) process. This document describes the criteria that must be utilized for evaluating site conditions including the quantity of groundwater present in order to eliminate the potable groundwater pathway at a site. The criteria presented in this operational memorandum has been adapted, as appropriate, for the application in the Underground Storage Tank Division's (USTD) RBCA process. This operational memorandum should be filed as Attachment 15 in your Guidance Document for Risk-Based Corrective Action at Leaking Underground Storage Tanks.

Regulatory Definitions

Groundwater: - Under Part 213 "Groundwater means water below the land surface in the zone of saturation."

Aquifer: - Part 201, Environmental Remediation, of Act 451, defines aquifer to mean, "a geological formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater to wells or springs."

Terminology as used in the Part 213 RBCA Process

Potable Groundwater: - Groundwater that is suitable and in sufficient quantity for human, animal and plant consumption, irrigation, and other uses within the residential, commercial and industrial categories. All potable groundwater must be protected for health based or aesthetic criteria, whichever is more restrictive, unless reliably restricted.

Non-Potable Groundwater: - Groundwater that is deemed unsuitable for the use specified in the potable definition due to naturally occurring elements and/or dissolved salts present in the groundwater. Documentation from the local health department should be provided regarding a determination of non-potability. Non-Potable groundwater may act as a transport mechanism to affect human or other receptors such as surface waters or other environmental areas or species.

Documentation to support the determination of an insufficient quantity of groundwater will require a detailed evaluation and/or documentation of site characteristics by the Qualified Underground Storage Tank Consultant (QC) to verify that the potable groundwater pathway does not exist. Reasonable and adequate subsurface investigations, which may include geophysical activities, must be performed to document that the stated condition exists. A higher degree of proof will be necessary to support this determination. The results of subsurface investigations

and review of published materials should verify a lack of hydraulic communication with another aquifer(s). Conditions may exist in certain areas of the state where the groundwater may be used as a private potable water supply by the use of "crock wells." Such areas include, but are not limited to, parts of the Saginaw Valley and "Thumb" area, Ottawa, Menominee, and Ontonagon counties. The QC should also identify if the site is located within a local wellhead protection program area. Contact should be made with the local health department to identify the areas served by "crock wells", and the Department of Environmental Quality Drinking Water and Radiological Protection Division to determine if sites are located in wellhead protection areas.

Criteria to eliminate the potable groundwater pathway.

In order for the QC to demonstrate that the groundwater present beneath the site is of insufficient quantity to meet the definition of aquifer, the following four (4) criteria must be met:

- 1. The groundwater formation below the site must yield an insufficient quantity of water considering local and regional hydrogeology. Any one of the following criteria are acceptable by the Underground Storage Tank Division (USTD) to document that an insufficient quantity of groundwater is present in order to eliminate the potable groundwater pathway.**
 - a) All site monitoring wells installed in the native material must bail dry after sustained bailing of less than five (5) gallons (excluding the volume of groundwater initially present in the well casing and filter pack).
 - b) The saturated thickness measured in the site monitoring wells must average less than two (2) feet when set at the bottom of the formation. The measurements should account for seasonal groundwater fluctuations.
 - c) The average in situ hydraulic conductivity based on at least three (3) site specific slug tests multiplied by 10 must be less than 5.0×10^{-6} centimeters per second, or an aquifer pumping test* that demonstrates a hydraulic conductivity of 5.0×10^{-6} . (Slug tests may underestimate the hydraulic conductivity by an order of magnitude.)
 - d) A site aquifer pumping test* demonstrates that the water bearing seams are isolated, and are not in communication with one another.
 - e) A site aquifer pumping test* yields less than 0.1 gallons per minute and the contamination will not leave the property above Tier 1 Residential Risk-Based Screening Level (RBSL) unless the off-site property is reliably restricted.
 - f) A determination that the well yield (Q) is less than 0.1 gallons per minute based on the use of appropriate hydrogeologic equations that incorporate aquifer condition (confined or unconfined), hydraulic conductivity(k) and saturated thickness (b). These equations must be shown to be applicable to the site hydrogeologic conditions. Estimate of hydraulic conductivity from aquifer slug testing would still need to be multiplied by 10 as a correction factor for use in these equations.
 - g) Other site specific Tier 2 evaluations may be proposed for review and approval by the USTD to eliminate the potable groundwater pathway.

*Aquifer pumping tests need to run for sufficient time to determine if boundary conditions (e.g., impermeable boundaries, recharge from leaky confining layers) are encountered. Plotting the drawdown versus time graphs in the field during the aquifer pumping test is recommended as a means of determining when the aquifer pumping test can be terminated.

2. **It must be demonstrated that a continuous confining layer exists across the entire site, and that the saturated zone is not in lateral or vertical communication with a lower adjacent aquifer.**
3. **The QC must provide the following supporting documentation in the Final Assessment Report (FAR) and/or the Closure Report:**
 - a) On-site boring logs and area well logs to substantiate the continuity of the lower confining layer, and the absence of communication with an aquifer. Provide a minimum of two (2) scaled cross-sectional drawings, with surface topography, in the FAR or Closure Report; one down the centerline axis of the plume and the other perpendicular to the axis across the plume width.
 - b) Documentation that the local health department was contacted to determine if “crock wells” for private potable water supplies exist within 500 ft. of the site and the Department of Environmental Quality Drinking Water and Radiological Protection Division was contacted to determine if the site is located in an approved local wellhead protection area.
 - c) Comparison of area surface water elevations with the site groundwater elevations.
 - d) Documentation on the local geology and topographical variances.
 - e) Document the site relationship to recharge and discharge zones in the area, including a map of paved areas or other surfaces which are impervious to infiltration.
 - f) Identify on a site map all buried utility corridors and other subsurface structures that may act as contaminant migration pathways due to their depth or proximity to the groundwater. Identify the depths of all utilities.
 - g) Identify if the groundwater elevations across the site can be reasonably predicted, and a groundwater flow direction has been determined. Indicate any seasonal variations in the saturated zone.
 - h) A map showing the thickness of the saturated zone across the site.
 - i) Identify any subsurface drainage structures that would artificially lower the water table.
 - j) Document any other unusual characteristics of the site that would assist in making this determination.
4. **Monitoring wells used in this evaluation must be properly constructed, and developed in accordance with standard operating practices.**

Site characteristics across the state may vary, therefore, additional factors concerning the site should be included or may be requested by the USTD. The QC should contact the USTD project manager or geologist concerning site specific issues not addressed by this memorandum.

NOTE: If the above criteria has been satisfied, the QC will still need to evaluate all other pathways to demonstrate that the groundwater beneath the site will not migrate or act as a transport mechanism to affect other exposure pathways and receptors, such as utilities, surface waters or inhalation.

This memorandum is intended to provide guidance to QCs and USTD staff to foster consistent application of Part 213. This document is not intended to convey any rights to any parties, nor create any duties or responsibilities under law. This document and matters addressed herein are subject to revision.

Questions about this memorandum should be directed to the appropriate USTD District Supervisor.

Responsibility for periodic review and revisions to this memorandum lies with the Chief of the Field Operations Section.

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| Authorization: | Date: |
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