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Is It a REC? – Groundwater Wells

Continuing the quest to better define recognized environmental conditions (RECs) when performing a Phase I environmental site assessment (ESA), we open 2019 with a discussion of groundwater wells. The ASTM International E1527-13 Standard Practice for Environmental Site Assessments includes in its Section 9, Site Reconnaissance, only this single mention of wells:

> *"To the extent visually and/or physically observed or identified from the interviews or records review, all wells (including dry wells, irrigation wells, injection wells, abandoned wells, or other wells) shall be described in the report."*

ASTM 1527-13 goes on to list "Records of Contaminated Public Wells" among the types of federal, state and local environmental records that should be reviewed when appropriate, and includes some types of wells in its definitions section. But what impact, if any, could a well have on a particular property? And, does it depend on the type and location of the well?

Basic Hydrogeology

Impacts to, and from, contaminated groundwater should be a central issue in any Phase I ESA, whether due to impaired property value, usability, or direct effects to human health and the environment. According to the U.S. Geological Survey and the National Groundwater Association, more than 20% of the U.S. population relies on groundwater for drinking (up to 99% in rural areas), with irrigation accounting for another 70%. The very nature of extracting or testing groundwater requires some degree of understanding of subsurface conditions, and the Environmental Professional (EP) will benefit from formal training in geology and subsurface hydrology. Still, some basic principles will prevail for almost all Phase I ESAs:

- **Go Deep** - A key consideration in groundwater flow or its vulnerability to contamination is depth to water. A well that draws from the shallow, water table aquifer that is closest to the surface is more susceptible to a surficial spill, such as from a leaking AST or UST. Deep wells are screened in deeper water bearing zones that may be confined or separated from the shallow zone by less permeable layers, and, as long as the well head is protected, are less affected by surface activities.

- **Groundwater likes to flow downhill** - The direction of groundwater flow is equally important as depth, as it can determine if a subject property is in the path of a contaminant source, or if it is likely protected by being at a higher groundwater elevation, or up-gradient from a potential source.

- **Vapor is a Fluid, too**– Determining if vapor intrusion is a REC for a particular property is almost always required in a Phase I, and direction of groundwater flow and separation (i.e., depth below a building or distance form a property line) is critical. (see *Is It a REC? Issue No. 7* for more information).

Types of Wells	Environmental Considerations when Conducting a Phase I ESA
Offsite Public Supply Well	Designated by a government entity as a public water supply. If contaminated, can be unsafe for subject property to use without treatment.
Onsite Private Supply Well	Draws water from on or below the subject property. Can be vulnerable to contaminant sources, and may act as a conduit for surficial contaminants to deeper drinking water aquifer.
Monitoring well	Used to sample groundwater elevations, flow direction, and contaminant conditions; usually an indicator of confirmed or suspected contamination on or near the subject property.
Remediation or extraction well	Used to pump and treat previously contaminated groundwater or vapors, or provide dewatering for control of groundwater flow or elevation.
Dry well	Constructed with permeable gravel or rocks to provide drainage, control spills or storm water runoff, or dispose of wastes. Can be a conduit of contaminants to groundwater.
Injection Wells	Regulated among six different classes depending on type of fluid injected, these can be simple dry wells for storm water infiltration, or sophisticated wells used for deep injection of industrial wastes or sequestration of greenhouse gas emissions.

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What to Include in the Phase I Report

The presence of a well on or near the subject property should always be clearly noted in the Phase I report, and will prompt the EP to seek out more information such as relative location, depth, use, ownership, and geology (well log). Absent this clarifying information, the mere presence of a well can be considered a REC.

The table on Page 1 lists some types of groundwater wells that may be encountered in your Phase I site visit and research. In the case of drinking water supply wells, the Phase I database search will provide a public record of wells within a certain radius of the property. This information can aid in determining subsurface conditions and groundwater flow directions at your property. More importantly, if the property's water is supplied by such wells, it will be important to note if the groundwater at the well area has been impacted by contamination or is at risk from some potential source.

If supply wells are located on the subject property, don't stop at simply noting location. Any available information for onsite supply wells should be carefully examined for permits and water quality test results, or testing recommended if not available. In the case of on-site abandoned supply wells, perhaps no longer in use because the property was connected to the municipal water supply, the reason for non-use should be identified. Improperly abandoned wells can be considered a REC. Most all state environmental agencies or health departments have regulations that require unused wells be permanently sealed by a licensed well driller. Otherwise the well can not only be a safety hazard, but also a conduit for surface contamination to directly enter the underground source of drinking water.

Monitoring wells, 2 to 4 inches in diameter and occurring as stick-up pipes or the harder to find flush-mounted manhole covers, must always be noted in a Phase I. The next step to finding these wells is to determine why they are on or next to your property, as their presence almost always indicates a Phase II ESA was performed for some reason. Deciding if there is enough existing information to explain the well's presence will determine if you can conclude that no further action (NFA) is needed, or if you have a REC to deal with. Monitoring wells larger than 4 to 6 inches diameter, or that are connected to pumping and treatment equipment may be remediation or extraction wells designed to cleanup a past release. These also are worthy of follow-up research to learn if the REC is ongoing, or if the REC could be considered *Controlled* or *Historic* (see CREC and HREC definitions in ASTM Standard or *Is it a REC?* Issue No. 6).

Monitoring or extraction wells that appear in seemingly random wooded areas or cleared, grassy mounds may indicate an active or closed landfill. Such wells are used to monitor groundwater leachate as well as gas and often will have some historical record associated with them.

Injection wells – Different from remediation wells used to temporarily inject treatment compounds, injection wells are permitted wells used for sub-surface disposal or storage of fluids into porous geologic formations. The six classes of injection wells are highly regulated, and their presence on or near a subject property must be carefully evaluated. Injection wells for non-hazardous fluids including storm water are regulated as Class V wells, and may be identified on a property as storm water drainage wells or dry wells. These wells should be noted on a property as they can act as a direct conduit for spills or contaminated runoff to the subsurface.

Oil and Gas wells – Wells used in the oil and natural gas extraction industry also are highly regulated and can impact environmental conditions on a property. Look for more details to be presented in a future article.

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