

Maintaining Monitoring Wells

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The primary reason for conducting groundwater monitoring at a landfill is to obtain accurate information about both the physical and chemical characteristics of the groundwater beneath the landfill. The chemical characteristics are important for evaluating groundwater quality and determining if the landfill has had a negative impact on groundwater. It is equally as important to understand the physical characteristics of the aquifer beneath the landfill (e.g. water table elevation and direction of groundwater flow) because this information allows for a more informed assessment of the impact and risk of any groundwater contamination. The monitoring well network may need to be reevaluated and updated as a result in changes in the facility or site hydrology.

All of the necessary data regarding physical and chemical characteristics of the groundwater aquifer is acquired from the network of monitoring wells installed at and around a landfill. To ensure that a monitoring well yields accurate and usable information, the well must be installed correctly and properly maintained throughout its usable life. Not maintaining a monitoring well may result in the need to replace the well. Maintenance includes visual monitoring and regular surveying of the well, making repairs, cleaning of dedicated pumps and other equipment, redeveloping the well as needed, and properly decommissioning the well when it is no longer needed. Information on proper installation and decommissioning of monitoring wells is provided in the *Monitoring Well Guidance* document available on the ADEC website via the following link:

http://dec.alaska.gov/spar/csp/guidance_forms/docs/Monitoring_Well_Guidance.pdf

Visual Monitoring

A properly installed monitoring well includes features like the protective cover, protective casing, and surface seal that help ensure that groundwater samples obtained from the well provide an accurate representation of the chemical characteristics of groundwater at that location. Therefore, maintaining a monitoring well throughout its useful life is a necessary aspect of the monitoring program. A convenient time to visually assess the condition of a monitoring well and the need for any maintenance is during a regularly-scheduled groundwater sampling event.

Visual monitoring of a monitoring well should include a quick check of the following components for damage, tampering, and/or movement due to frost-jacking:

1. The protective casing (stick-up well) or the surface monument (flush-mount well)
2. The concrete ground seal
3. Any identification marks or labels
4. The lock and other access control devices
5. The well cap
6. The well casing

Some of these items (e.g. a damaged lock) can be repaired or replaced during the monitoring event. Damage that cannot be addressed at that time should be noted on the monitoring log and repaired during a follow-up visit as soon as possible to maintain the integrity of the monitoring well and the quality of the data obtained from the well.

Surveying

Having accurate and current data about both the location of the monitoring well and the elevation of the top of the well casing is very important for calculating the elevation of the water table and the flow direction of the groundwater. Surveying the location of each well on the landfill property should be part of the well installation process and the results of the survey should allow the wells to be accurately plotted on a scaled plan-view map of the landfill property. Doing so allows the data collected from each well to be plotted relative to the other wells on a scaled map of the landfill, which makes the data much more useful.

Every groundwater monitoring event should include measuring the depth to groundwater in each monitoring well. This is typically measured from a measuring point marked at the top of the well casing, and the elevation of that measuring point is usually determined via survey at the time the well is installed. These depth-to-water measurements are used to determine the elevation of the water table, and those elevations are used to estimate the general flow direction of groundwater beneath the landfill. This progression emphasizes the need for accurate measuring point elevations. Unfortunately, a number of factors (e.g. frost jacking, isostatic rebound, and well repairs) can cause a well casing to move, and each such movement can change the elevation of the measuring point. In areas with a flat water table, even slight changes in the elevation of a well casing can affect the accuracy of the calculated groundwater flow direction. Therefore, maintaining an accurate elevation for the measuring point at each monitoring well is critical to a meaningful monitoring effort. To ensure the accuracy of the data collected, the ADEC recommends an annual leveling survey to confirm the measuring point elevations for all monitoring wells at the landfill.

During each monitoring event, the results of visual monitoring and any maintenance work that was done should be noted on the monitoring log for the well along with the various measurements taken from the well. If the wells were surveyed before or as part of the monitoring event, the new measuring point elevation for each well should also be recorded on the monitoring logs. To ensure there is an accurate and complete record of the monitoring event, the monitoring log for each well sampled during that event should be attached to the monitoring report for that event.

Common Monitoring Well Problems

Every monitoring well will require some level of maintenance at some time during its usable life. Simple observations during routine monitoring events will help provide information when maintenance is needed and can help to identify some common problems. **Note that any downhole maintenance should be completed prior to purging and sampling the well.**

A common problem in monitoring wells is increased turbidity in the samples collected from a well. Since increased turbidity is an indication that sediment is getting through the filter pack around the well casing, it is also a good indicator that the monitoring well should be redeveloped. Therefore, it is important to measure and note turbidity during sample collection and to watch for changes over time. Monitoring wells can be redeveloped using the same techniques that are used for developing newly-installed monitoring wells. Every well should periodically be redeveloped and this should be done before increased turbidity starts to affect sample quality and the analytical results.

Another common problem in monitoring wells is the accumulation of sediment in the bottom of the well. Accumulating sediment can be tracked by measuring the total depth to the bottom of the well each time the well is sampled. After measuring the depth to water in the well, the measuring device should be extended to the bottom of the well and the distance from the measuring point noted on the sampling log. Changes in the total depth of the well provide a record of the amount of sediment that has accumulated. Accumulated sediment can be removed by “vacuuming” the bottom of the well with the intake of a pump.