

Inspecting Monitoring Wells at Landfills

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Background

Section NR 507.13, Wis. Adm. Code requires landfill owners or operators to inspect the facility's wells each time they are sampled or when water level in the well is measured, and no less often than annually. This guidance is intended to provide direction for sampling personnel performing inspections at monitoring wells. The attached example inspection checklist can be used to document the well inspection. Attached figures 1 & 4 from ch. NR 141, Wis. Adm. Code, show typical well construction details.

The DNR may ask to review documentation of well inspections during an inspection, when the owner or operator submits a request to DNR for a reduction in monitoring frequency, or at other times. Well inspections are an important part of solid waste facility operations. If a well is in poor condition the water sample results may not be representative of the water quality at the monitoring point.

If a well is damaged or fails to function properly, the owner or operator must notify the DNR within 10 days of discovery. A damaged well can become a conduit for surface water to enter the well and contaminate groundwater. If the well cannot be repaired it must be permanently filled and sealed following the abandonment requirements in s. NR 141.25, Wis. Adm. Code, and must be replaced within 60 days unless an alternate schedule is approved by the DNR in writing.

Applicable Wisconsin Administrative Codes:

- NR 507.04(3) - Protection for monitoring devices
- NR 507.04(4) - Labeling for monitoring devices
- NR 141.13(3)(a) and (b) - Ground surface seal and protective cover pipe for monitoring wells
- NR 141.13(4) - Ground surface seal and flush mounted protective cover pipe for monitoring wells

Definitions:

- A monitoring well casing is the pipe that makes up part of the structure of the well and is generally made of PVC. Specifications for well casing material are provided in s. NR 141.07, Wis. Adm. Code.
- A monitoring well protective pipe is the metal outer pipe that fits over the well casing and is commonly made of steel or anodized aluminum. The protective cover pipe must have a locking cap and meet the specifications provided in s. NR 141.13 (3) (b), Wis. Adm. Code.

Inspection Recommendations

The DNR recommends the following items be verified during monitoring well inspections:

- Is the well clearly and permanently labeled on the outside of the device (such as on the metal protective cover pipe or a sign posted adjacent to the well)? This is intended to avoid an unlabeled well being mistaken for another well, which would result in incorrectly reported sample results.
- Can the well be found easily? It may cost more to sample a well if it cannot be found easily. Clearing brush from around the wells and along the path to and from the well, and using a colored sign post or flag taller than the well height and brush to mark the well location, will make the monitoring wells at a facility easier to find.

- Does the well need additional well protection such as brightly colored bumper posts, boulders, etc., to avoid damage from occurring in high traffic areas? The cost to protect a well could be significantly less than to repair or replace it.
- Is the well locked? Secure the locking cap to the protective cover pipe to reduce the risk of vandalism which could result in a change of water quality or irreparable damage.
- Does the well have a metal protective cover pipe? A metal protective cover pipe with locking cap is needed to secure and protect the well from damage.
 - The protective cover pipe must extend at least 24 inches above ground level (except flush-mounted wells). This is to assure water due to flooding conditions does not overtop the well.
 - The protective cover pipe must extend above the well casing. Otherwise the locking cap may not close properly.
 - The top of the well casing must terminate no more than 4 inches below the top of the protective cover pipe. If the protective cover pipe extends more than 4 inches above the top of the well casing it may not be possible to accurately measure depth to the water in the well.

The area between the protective cover pipe and the PVC well casing may be filled with pea gravel to improve the stability of the well, provided it does not interfere with monitoring. We suggest not filling this area with bentonite or concrete as it can pull on the PVC casing should the protective cover pipe heave, and using sand can act as a nesting site for ants. The protective cover pipe may have a small hole drilled into it at ground level to allow rain water to drain from the space; water held in the space can freeze and damage the well.

- Has the well moved (e.g., heaved, sunk or bent) from its original construction position such that accurate water level measurement or the sampling procedure may be compromised?
- Is a reference water level measuring point established on the inner casing material? The well casing (typically PVC) may not be level across the top to measure water level to one one-hundredth (1/100th) of a foot. It is important to measure water level consistently each time.
- Is the well cap vented? A vented well cap equalizes atmospheric pressure resulting in more accurate water level measurements (especially in wells screened in clay). A PVC cap can be vented by drilling a small hole into the top or cutting slots into the side. However, if the well is also used for gas monitoring, then the cap cannot be vented as gases would escape the well prior to measuring gas levels.

An adequate ground surface seal around the well prevents surface water from entering the well and contaminating groundwater or affecting the sample quality. Inspect for the following:

- Is soil or clay mounded over the surface seal sloped to shed water away from the well casing? If there is a depression around the well or an indication of water ponding around the well the surface seal may not be in good condition and should be repaired or replaced, the well elevation re-surveyed, and soil added to shed water away from the well.
- What is the condition of the ground surface seal? Note: Under Wisconsin weather and specific site conditions concrete surface seals may not hold up as long or well as bentonite seals.
 - For a concrete surface seal, is the concrete in good condition (i.e., not cracked or heaved)?
 - For bentonite surface seal, is it covered with native soil to prevent the bentonite from drying out?
- For a flush mounted well:
 - Is the well installed in an area that will not pond with water?
 - Is the well installed through an impervious surface (i.e., concrete or asphalt)?
 - Is the metal protective cover watertight?
 - Does the well have a watertight cap?
 - Is either the well or protective cap locked?

We recommend sampling personnel prepare a written well inspection log and give a copy to the owner or operator or document on the sampling/purging sheets that the well was inspected and note if repairs are or are not needed. By documenting the inspection, the owner or operator can be assured that inspections are being conducted in compliance with state code. The owner or operator can be proactive and make repairs before the well becomes irreparable and avoid a costly well replacement.

We suggest sampling personnel report to DNR's Groundwater and Environmental Monitoring System (GEMS) database a well that is broken (code 00004), frozen (code 00005), or dry (code 00006). Also, reporting depth to well bottom (code 72003) can be useful to track if the well is filling in with sediment.



Figure 1. As a result of neglect, soil erosion around the cement surface seal exposed the PVC well casing. Replacing the well may be the only option.



Figure 2. Well label attached to the well casing clearly showing the well name and DNR monitoring point ID number.



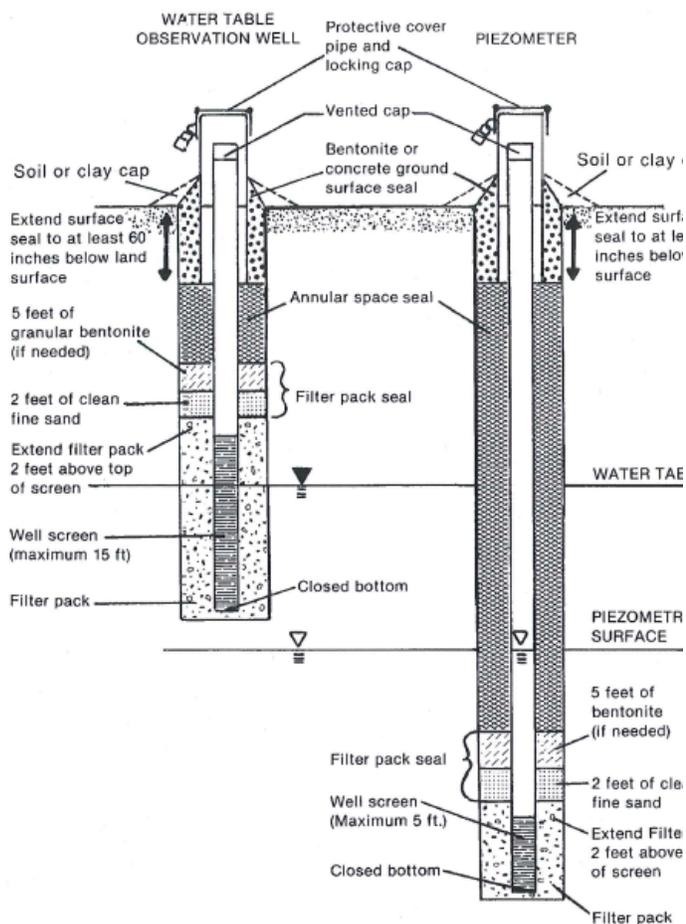
Figure 3. Photo of metal well label with a welding bead used to write the name of well on the label. This can be made in a shop and installed in the field without bringing a welder to the well.



Figure 4. Sign with well name near the well. While the label is not on the casing, this is acceptable if it is clear which well the sign is identifying.

Figures from ch. NR 141, Wis. Adm. Code, monitoring well and flush mounted well construction details.

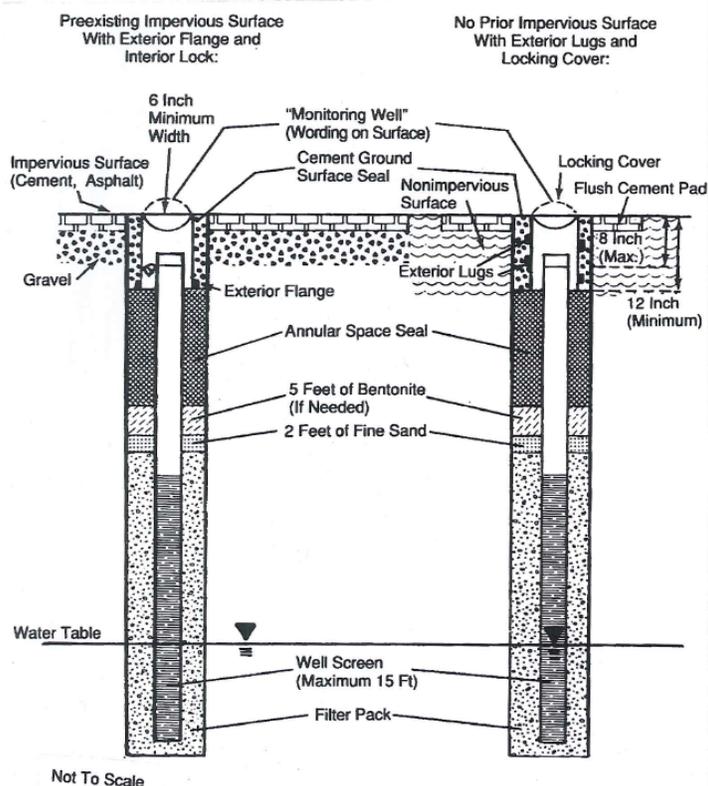
Figure 1.
Typical water table observation well and piezometer construction details.



Not to scale

Figure 4.

Two typical flush mounted protective cover pipes after installation.



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Contact (608) 266-2111 or DNRWasteMaterials@wisconsin.gov for further information.

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Attachment 1: Groundwater Monitoring Well Inspection Checklist

Facility Name:					
Facility License/ID #:				Facility Locatio	
Inspector Name:				Inspection Dat	
Items Inspected	Point ID		Point ID		Point ID
	Name		Name		Name
Is the well clearly labeled on the outside of the well?					
Is the well easily found?					
Is the well locked?					
Does the well have a metal protective cover pipe?					
Is the pipe at least 24 inches above ground?					
Does the pipe inhibit the well from being closed and locked?					
Is the pipe more than 4 inches above the well top making it difficult to record accurate water levels?					
Is the well cap vented? Except for wells also used for gas monitoring.					
Surface seal type:					
Is the seal in good condition?					
Is soil or clay mounded over the seal sloped to shed water away from the well?					
If bentonite, is it covered with native soil to reduce bentonite desiccation?					
Has the well moved from its original position? (e.g. heaved, sunk, bent)					
Is a groundwater elevation reference measuring point established on the inner casing?					
Is there evidence of water ponding around the well casing?					
If flush mounted well					
Can it be locked?					
Is the well in an area that will not pond water?					
Is it installed through an impervious surface? (surface type)					
Is the steel cover water tight?					
Does the well have a water tight cap?					
Is additional protection necessary such as bumper posts?					
Other comments:					

Please give a summary report of action items that need repair or maintenance to the landfill owner/operator.