Best Management Practices for Managing Water at Well Drilling Sites

Depending on site-specific hydrologic conditions, the construction of water supply, geothermal, and other wells may produce large volumes of water during the drilling process. The water produced from the drilling activity is often laden with rock cuttings, silts, clays, etc. referred to as "suspended solids". The suspended solids can be substantially increased if drilling water is allowed to flow overland and erode the ground surface. The transport of suspended solids is considered a non-point pollution source and may adversely impact surface water, wetlands, stormwater basins, etc. Discharges of this material that result in a stream standard violation are illegal and may be subject to a civil penalty assessment of up to $25,000 per day for each violation. It is the responsibility of the well contractor, permit holder and general contractor to manage through volume reduction and treatment, water generated onsite prior to discharge.

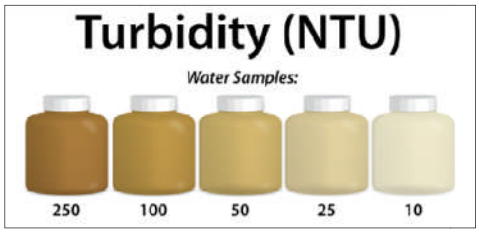
This document is intended to introduce contractors to strategies or 'best management practices' available to avert impacts from drilling operations. Additional measures or alternative practices may be necessary dependent upon the site. Many of the practices used to control stormwater on other construction sites may be applied to drilling operations as the end goals are the same: reducing sediment runoff. DWQ's Stormwater Best Management Practices Manual offers an additional, more detailed resource and may be found here: http://portal.ncdenr.org/web/wq/ws/su/bmp-manual . **Engineered solutions are typically required where large volumes of water are expected or a large number of wells are installed in one area.**

What is a BMP?

BMPs are 'best management practices' implemented onsite to treat or limit pollutants (e.g., suspended solids) from entering surface waters or impacting groundwater. BMPs may include altering processes or installing structures to reduce, retain, or treat sediment-laden water. BMP '**processes**' include altering drilling rig air pressure to reduce the volume of water generated, drilling in phases, limiting the number of active drill rigs onsite, use of diverters, and reducing drill bit size to the minimum size necessary. BMP '**structures**' include installation of sediment ponds, filter bags, fabric lined trenches,'frac' tanks, filter boxes, use of flocculants, and filter strips.

What is the impact of muddy water, suspended solids, and turbidity being released from my site?

Sediment leaving your site can blanket the stream bottom and smother fish eggs, macroinvertebrates, and aquatic plants. The influx of turbid water to a stream may also lead to an increase in water temperature and a decrease in dissolved oxygen, which further stresses the aquatic community. Turbid water carrying sediment may pickup nitrogen, phosphorus or other pollutants that adhere to sediment particles. These pollutants are ultimately deposited into the receiving water body. Turbidity is a measure of water clarity that is usually assessed with a meter and reported in Nephelometric Turbidity Units (NTUs). The standard for surface water bodies begins at 10 NTUs for trout waters.

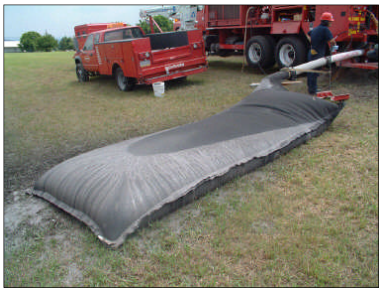


What are some BMPs DWQ expects to be implemented at drilling sites?

The selection of BMPs used onsite is dependent upon several factors that differ between sites. These include test well yield (how much water do you expect), proximity to surface water bodies, proximity to stormwater inlet, size of drilling operation (5 wells or 200 wells), amount of overburden, soil types, vegetative cover, weather or season of the year, and terrain. Drilling contractors should carefully consider and budget as necessary bids on drilling jobs to include BMPs or ensure contractually that other entities (permit holders, general contractors, etc.) will be installing and be responsible for managing BMPs. Regardless of adequate planning, modification of existing BMPs to address changes occurring onsite are often necessary.

Please note that many treatment structures require that water be captured at the drill rig and transported to the structure directly. Capturing the water is typically done with use of a diverter system (see photo right). Preferably, water is transported through a pipe or lined trench in a manner whereby no additional sediment is added to the water.

Examples of BMPs being used on well construction sites to address turbid water include: •Sediment Filter Bag: This device traps sediment while allowing water to flow through the bag. Sediment captured in the bag can be spread on vegetated land following use. It is important to consider estimated flow rate and sediment size when evaluating this option. Initial flow rates of water through the bag can be as high as 800 gpm.



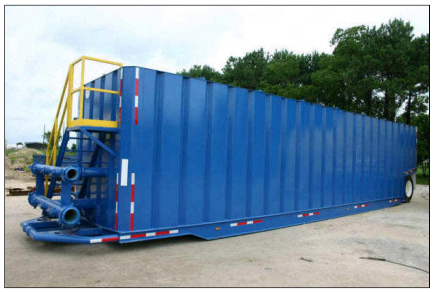
• Trench: Establishing geotextile lined trenches is a proven method of transporting sediment-laden water from the drill rig to a treatment structure or to a vegetated filter strip. With the use of weirs and a low gradient, sediment can begin to drop out of suspension while moving in the trench.

• Sediment pond: A temporary pond or several ponds constructed in series to capture turbid water and provide time to allow sediment to settle out of suspension. After water sufficiently settles or is allowed contact time with a DWQ approved flocculent, the water may be released. **Before using flocculants (e.g, PAMs), prior permission must be obtained from DWQ**. Allowing the water to evaporate if sufficient holding capacity exists or release to a vegetated filter strip may also be acceptable. Sediment pond or settling basins can be designed in various sizes to accommodate the flow. The use of the erosion control basin permitted solely for the construction activities is not acceptable. These basins are designed and approved for use with a site specific quantity of water; adding the water produced from drilling activities may overburden these basins.

• Dike, ring, or fence structure: A containment and filtration structure composed of hay bales, silt fencing, size 57 stone, or other materials to filter sediment from smaller volumes of turbid water. These materials can be used in various designs and at various scales. The structure can encircle the drill rig or borehole to filter water or be placed in ditches or trenches downslope from the drill rig. The structure should have adequate capacity to prevent overflow or by-passing of the filter media unless other filter structures are in place down-gradient.

• Sediment tank/filter box: A tank structure constructed from steel drums, modified dumpsters, wood, or other materials filled with sand, gravel or other material to trap and filter slurry water. Portions of the structure after the filter media may be perforated to allow discharge to the surface or have a discharge port to pipe water to other filtration devices. Consideration should be made for moving the structure once it is filled with sediment. The treatment volume of the structure should also match the anticipated flow volume during well construction.

• Dewatering containers: These are similar to large 'frac' tanks (see photo) but serve to filter or separate slurry water and allow settling of sediment to the bottom of the container. The 'cleaned' water can then be released onsite. 'Frac' tanks may also serve to simply store water (up to 21,000 gallons) onsite until treated or hauled to another facility for treatment and release. These tanks can be rented and placed onsite.



• Discharge to sanitary sewer: This may be an option dependent upon the site and conditions. Consideration should be made in regard to costs associated with the discharge. **You must also obtain permission from the receiving sewer authority**. Please contact the regional Aquifer Protection Section office prior to discharging.

For additional information, please contact your NCDENR regional office of the Aquifer Protection Section. Contact information is available online at http://portal.ncdenr.org/web/wq/home/ro