

Monitoring wells will be constructed using 2-in diameter, flush-threaded PVC casing. The screen length will be up to 5 ft with continuous slot openings of 0.010 in and a PVC plug on the bottom of the screen. The annular space around the screen will be back-filled with silt free silica sand (WB 40 grade) to a height no more than 2 ft above the top of the screen. A minimum 2-ft thick seal of hydrated bentonite will be placed above the sand pack. The remaining annular space will be filled with a neat cement grout or bentonite slurry with more than 20% solids placed with a tremie pipe. The PVC riser will be covered with a lockable, watertight PVC cap. A 4-in diameter galvanized steel, locking, protective casing will be installed at the surface with a concrete anchor and runoff diversion apron.

Once installed, the grout will be allowed a minimum of 24 hr to cure after which time the well will be developed. Well development will be performed using the pump and surge method. A minimum of five casing volumes will be removed from the well or until the well is pumped to dryness.

5.1.5 Monitoring Well Abandonment Procedures

This procedure will be used for abandoning of monitoring wells at the Coldwater Road Landfill Facility. MDEQ approval is required prior to performing monitoring well abandoning. The wells will be abandoned in accordance with Part 111 Rule 299.9612 (1)(b), methods outlined in this Plan, or per an approved work plan. Two methods may be used in accordance with this Rule to abandon a well. The first method involves over drilling and removal of the well materials and pressure backfilling the open hole with a cement/bentonite grout. The second method involves using a tremie pipe to pressure inject the cement/bentonite grout mixture into the well with the well materials left in place.

The preferred method for abandoning deep double-cased wells is to leave the well materials in place, except for the above ground riser and protective casing, and pressure grouting the well from the bottom to ground surface. The method for abandoning shallow wells will be determined by a geologist. The geologist will review monitoring well construction details and soil boring logs to assess whether the well intersects more than one water-bearing unit. The well will either be over drilled, well materials removed and filled with a neat cement grout or bentonite slurry with more than 20% solids, or filled in place with a neat cement grout or bentonite slurry with more than 20% solids. Above ground materials (riser and protective casing) will be removed to approximately 2 ft below grade.

These procedures were implemented to abandon two wells (MW-25 and MW-26) at the conclusion of four quarters of sampling in which analytical data indicated four quarters of results below the groundwater/ surface water interface criteria. The MDEQ issued a letter dated September 7, 1999, approving the termination of groundwater sampling of these wells and approved the abandoning of these wells. The wells were abandoned in accordance with the above discussion for shallow wells by removing well materials and cement/grouting the hole.

These procedures were also implemented in the abandonment of monitoring wells B-14, B-29 and B-30 as approved by the MDEQ in their letter dated April 9, 2008. Monitoring well B-14 was over-drilled and the borehole was grouted because of the longer than normal sand pack. Wells B-29 and B-30 were pressure grouted in place.

5.1.6 Benchmark and Monitoring Well Top of Casing Surveying

The top of casing elevations will be established by a licensed land surveyor for new monitoring wells installed in accordance with Section 5.1.4 following installation and prior to their use for the construction of groundwater contour maps for the site. As part of this surveying effort the benchmark or benchmarks (a.k.a., witnesses) utilized to provide control for the top of casing elevation survey will be inspected and surveyed.

In addition, the benchmark(s) and the top of casing elevations for the wells that are part of the groundwater monitoring program, which currently include the following 13 wells: B-2D, B-7, B-9, B-18A, B-19A, B-19Ar, B-20D, B-21D, B-22D, B-23Dr, B-24r, B-27D, and B-28 will be re-surveyed by a licensed land surveyor at a minimum frequency of once every five years. The new top of casing elevations will be utilized in the construction of groundwater contour maps subsequent to the re-surveying event.