

# Class Two Landfill Groundwater Monitoring Workplan Development Guidelines

Prepared by South Carolina Department of Health & Environmental Control  
June 3, 2008

This document is not meant to encompass all aspects of SC Regulation 61-107.19. It was prepared to assist regulated parties when considering issues related to groundwater monitoring at Class 2 facilities. Please review the entire regulation to gain a complete understanding.

## I. Introduction

Beginning May 23, 2008, all existing C&D landfills will be required to design, install and implement groundwater monitoring systems under the new consolidated Solid Waste Regulation R.61-107. There are two main regulatory requirements that dictate how best to approach establishing an approvable groundwater monitoring system at the Class Two landfills. These regulatory citations are R.61-107.19 Part IV.E.1.c and R.61-107.19 Part IV.E.1.d.

These requirements essentially say that you need to install a groundwater detection monitoring system capable of producing representative groundwater samples downgradient of the disposal unit. Although the regulations require a minimum of four wells at each facility, the final number, spacing, and depths of monitoring wells will need to be determined by a thorough characterization of the underlying lithology and hydrogeologic conditions and will be unique to each landfill. For reference, the exact wording from the regulations is as follows:

### Regulatory Requirement R.61-107.19 Part IV.E.1.c

*The monitoring system must consist of a sufficient number of wells installed at appropriate locations and depths to yield representative groundwater samples from the uppermost aquifer that can determine if contamination has occurred due to a release from the landfill. There shall be a minimum of one well up gradient and three wells down gradient of the disposal unit.*

### Regulatory Requirement R.61-107.19 Part IV.E.1.d.

*The number, spacing, and depths of the wells in the monitoring well network shall be determined based upon site-specific technical information that shall include thorough characterization of:*

1. *Aquifer thickness, groundwater flow rate, groundwater flow direction including seasonal and temporal fluctuations in groundwater flow; and,*

2. *Saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining unit defining the lower boundary of the uppermost aquifer; including, but not limited to: thicknesses, stratigraphy, lithology, hydraulic conductivities, porosities and effective porosities.*

In order to design a Groundwater Detection Monitoring program at a new facility that satisfies these requirements, a phased approach is recommended. The phased approach should consist of three steps: 1) **Groundwater Monitoring System Design Workplan**; 2) **Groundwater Monitoring System Design Report**; and 3) **Groundwater Detection Monitoring Plan**.

## **II. Implementation**

Submittal of the **Groundwater Monitoring System Design Workplan** within 180 days of the effective date of the regulations will satisfy R.61-107.19 Part IV.E.1.b.2. The **Groundwater Monitoring System Design Workplan** would lay out a strategy that would be capable of adequately characterizing the aquifer thickness, groundwater flow rate, groundwater flow direction, lithology of the uppermost aquifer, lower boundary of the uppermost aquifer and confining unit defining the bottom of the uppermost aquifer as required by R.61-107.19 Part IV.E.1.d. This document would also include a detailed schedule for implementation of the characterization efforts that would lead to a final Groundwater Detection Monitoring System. It should be noted that a detailed schedule that describes the process from data collection to monitoring well system installation will be crucial for the Department to approve this plan.

Upon approval of the **Groundwater Monitoring System Design Workplan** by the Department, the facility would implement the plan following the detailed schedules approved in the plan. Once all of the characterization efforts are complete, a **Groundwater Monitoring System Design Report** would be submitted to the Department containing a full interpretation of all characterization data collected and a proposal to install a final Groundwater Detection Monitoring System. Approval of this document would start the 180 day clock for implementation and installation of an approved Groundwater Detection Monitoring System as required by R.61-107.19 Part IV.E.1.b.2.

Following the installation of the approved Groundwater Detection Monitoring system outlined in the **Groundwater Monitoring System Design Report**, the facility should submit to the Department for approval a **Groundwater Detection Monitoring Plan**. This plan should include a site map showing all the detection monitoring well locations in

relation to the landfill footprint, a list of constituents to be monitored for, sampling frequency, sampling and analysis plan, a statistical monitoring plan and reporting schedule. Approval of this document will satisfy the requirement for the implementation of the Groundwater Detection Monitoring System required by R.61-107.19 Part IV.E.1.b.2.

If significant lithologic and hydraulic information already exists for the uppermost aquifer beneath the disposal unit and can be summarized and interpreted in such a way as to justify the number, locations and depths of the final groundwater monitoring system, the Groundwater Monitoring System Design Workplan and Groundwater Monitoring System Design Report may be combined into one document. In this case, a Groundwater Monitoring System Design Report would be submitted that summarizes and interprets the existing information and proposes the locations of the Groundwater Detection Monitoring System. If a facility develops a report with existing data, it is recommended that the facility meet with the DHEC project Hydrogeologist prior to submittal of the report to ensure that the existing data will satisfy the requirement of R.61-107.19 Part IV.E.1.d.

### **III. Document Content**

**Groundwater Monitoring System Design Workplan** - (Satisfies requirement to submit plan within 180 days of effective date of regulations in R.61-107.19 Part IV.E.1.d) - Should include a proposal to delineate of uppermost aquifer, depth to confining unit, lithology of uppermost aquifer, groundwater flow rates, groundwater flow directions using lithologic borings and piezometers in order to adequately site the final groundwater detection monitoring well system. In many cases, it is expected that many of the piezometers will be able to be converted to monitoring wells, avoiding duplication of effort.

**Groundwater Monitoring System Design Report** - (Satisfies R.61-107.19 Part IV.E.1.c) - Report should include all of the data collected in the **Groundwater Monitoring System Design Workplan** and interpreted in a way as to justify the number, locations, and depths of the proposed groundwater detection monitoring wells. If groundwater elevation and lithologic borings to the depth defining the thickness of the uppermost aquifer exist for the landfill, then that information should be summarized in table and graphical form and used to locate the most appropriate monitoring well locations. In this case, there may be no need for the **Groundwater Monitoring System Design Workplan**.

**Groundwater Detection Monitoring Plan** - (Satisfies R.61-107.19 Part IV.E.1.b.2) - This plan should include a Site Map, Well Locations, Sampling and Analysis Plan, Statistical Analysis Plan, and constituent monitoring list. Approval of this plan will

satisfy the required implementation date of 180 days after approval of the plan R.61-107.19 Part IV E.1.b.2.

#### **IV. Other Requirements**

R.61-107.19 Part IV.E.1.a – All submittals made to the Department in compliance with this section shall be signed and stamped by a qualified professional. Qualified professional is defined in the new Solid Waste Management Regulations under the definitions section as a “...qualified South Carolina registered professional geologist or qualified South Carolina registered professional engineer. Under Part IV Section E and Part V Section E the qualified professional shall have sufficient training and experience in groundwater hydrology and related fields, including groundwater monitoring, contaminant fate and transport, and corrective-action.”

R.61-107.19 Part I, A.6.c – Within 18 months of the effective date of this regulation, all existing facilities must be in compliance with all requirements of the new regulations.

This implies a groundwater detection monitoring system must be in place and operating within 18 months of the effective date of this regulation. Since the Groundwater monitoring plan must be submitted within 180 days of the effective date of these regulations (November 19, 2008) and the groundwater monitoring plan must be implemented within 180 days of approval of the groundwater monitoring workplan, the facility needs to provide quality submittals in order to avoid delays in the implementation of the monitoring system beyond the 18 month timeframe.