TCEQ REGULATORY GUIDANCE
Remediation Division
RG-523/PST-06 • June 2014

Groundwater Monitoring and Reporting for LPST Sites

Introduction

Groundwater monitoring activities (gauging and sampling) are necessary to document subsurface conditions, including seasonal variations in groundwater elevations, contaminant concentrations, and thicknesses of non–aqueous phase liquid (NAPL). These activities should be sufficient to monitor groundwater for contaminant-plume migration and the effectiveness of remedial activities. Samples must be collected from properly constructed monitoring wells to be considered representative of groundwater conditions.

This document contains guidelines for registered corrective action specialists and licensed corrective action project managers on groundwater monitoring and reporting for leaking petroleum storage tank sites in Texas.

Monitoring Guidelines

- At least four consecutive quarterly groundwater monitoring events are required to sufficiently document subsurface conditions. This guideline should be met before considering a reduced sampling frequency.
- Monitor newly installed monitoring wells quarterly until groundwater elevations and contaminant concentrations are sufficiently documented.
- During each event, monitor the wells immediately down-gradient of the source—for the purposes of this document, the area exhibiting the current maximum contaminant concentrations.
- Monitor impacted or threatened water-supply wells and sentinel wells at least quarterly. Notify the TCEQ project manager immediately upon discovery of an impacted receptor.
- Gauge all monitoring wells during each event unless the TCEQ has stated otherwise. Inspect all monitoring wells for damage. When NAPL is present, adjust the gauging frequency based on NAPL thicknesses and methods of recovery.
- Gauge tank-hold observation wells for the presence of NAPL during each event.
- Monitoring wells containing NAPL should not be sampled unless otherwise stated by the TCEQ.

Apply the following guidelines for reduced sampling frequencies once groundwater-contaminant concentrations have been sufficiently documented:

- If the results of two successive quarterly groundwater monitoring events indicate that contaminant concentrations detected in a specific monitoring well are of approximately the same order of magnitude as concentrations previously observed, the sampling frequency for that monitoring well may be reduced to semi-annually.
- If the results of two successive quarterly groundwater monitoring events indicate that contaminant concentrations found in a specific monitoring well have consistently remained stable and below applicable target levels, or are non-detected, the sampling frequency for that monitoring well may be reduced to annually.
- All monitoring wells should be sampled at least annually.

Reporting

After completion of groundwater-monitoring activities, a groundwater monitoring report (Form TCEQ-00013) with applicable attachments should be prepared and submitted to the TCEQ within 45 days. Typically, the report should be submitted annually if multiple groundwater monitoring events are conducted within a 12-month period. A report documenting a single event should only be submitted when a single event is planned or requested by the TCEQ for a determination regarding the next appropriate phase of corrective action. Cumulative tables of analytical results and groundwater-level measurements need to be maintained and attached to work plans and reports submitted to the TCEQ.

The form should be accompanied by the following attachments:

a. **Report Summary:** Briefly describe groundwater monitoring activities and discuss any significant observations or changes in subsurface conditions.
b. **Chronology of Events:** Should include dates and brief descriptions of site activities and significant events dating back to the initial release investigation.
c. **Cumulative Table of Groundwater Analytical Results:** List each groundwater sampling date in chronological order below each monitoring-well number. Each contaminant and applicable target concentration must be specified.
d. **Cumulative Table of Groundwater Level Measurements:** List each groundwater gauging event in chronological order below each monitoring-well number. Include surveyed top-of-casing elevations, monitoring-well screened intervals (measured in feet below ground surface), depth-to-water measurements, calculated groundwater elevations, and NAPL thicknesses.

e. **Site Map:** Should include a dated title block, north arrow, bar scale, and legend. Should also depict the location and layout of all underground or aboveground tank systems associated with the facility (including pipe chases, dispensers, remote fill ports, etc.), sampling points, and the nearest road intersection.

f. **Contaminant Distribution Map(s):** Should include a contaminant-distribution map for each monitoring event depicting groundwater-contaminant concentrations for each monitoring well. Note NAPL thicknesses when present.

g. **Groundwater Gradient Map(s):** Should include potentiometric surface maps depicting the subsurface flow of groundwater for each gauging event documented in the report. Groundwater elevations from tank-hold observation wells should not be incorporated in groundwater gradient maps unless the tank-hold water is hydrologically continuous with the affected aquifer.

h. **Conclusions and Recommendations:** Summarize ongoing assessment or remediation activities at the site and give recommendations for the next appropriate phase of corrective action.

i. **Quality Assurance / Quality Control (QA/QC) Procedures:** Should include detailed descriptions of sampling activities, including equipment used, decontamination procedures, sample collection and handling methods, and a summary of the overall sampling rationale.

j. **Appendixes:** Should include the following attachments:

- Completed laboratory reports documenting sample analyses.
- Laboratory QA/QC.
- Chain-of-custody documentation.
- A narrative or checklist documenting an independent review of the laboratory data package to document the acceptability and usability of the data, problems or anomalies associated with the data, and resolutions of any noted laboratory issues.
- Documentation for all materials transported off-site for disposal, treatment, storage, or recycling. If purge fluids were generated but not disposed of, the report must explain the status and give the location of purge fluids and an approximate date for disposal.

Monitoring and Remedial Action

Groundwater monitoring activities associated with operation, monitoring, and performance (OMP) of a remediation system may require alternative groundwater-monitoring frequencies as discussed in other guidance documents or otherwise stated by the TCEQ. Such activities should be conducted in conjunction with routine scheduled OMP site visits and be documented in the annual OMP report (Form TCEQ-00696). Once operation of the remediation system is discontinued with concurrence

from the TCEQ, quarterly post-remediation groundwater monitoring should be implemented to observe subsurface changes under normal conditions, and a groundwater monitoring report (Form TCEQ-00013) with applicable attachments should be prepared and submitted to the TCEQ after the completion of four consecutive quarterly groundwater monitoring events.