Part III
Attachment III-F
Appendix III–F.2

GROUNDWATER SAMPLING AND ANALYSIS PLAN

Pescadito Environmental Resource Center
MSW No. 2374
Webb County, Texas

PESCADITO
ENVIRONMENTAL RESOURCE CENTER

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Table of Contents

List of Tables

Appendix III-F.2-1 Laboratory Review Check List

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2.3 Depth to Water Measurements

Prior to purging each monitoring well, the depth to water will be measured from a permanently marked reference point of known elevation on the top of the inner monitor well casing. The depth to water will be recorded to the nearest one-hundredth of a foot. Per §330.405(b)(2), the depth to water measurements should be collected over a period of time short enough to avoid temporal variations in groundwater elevation. The total depth of the monitor wells should be measured periodically to assess potential sediment accumulation within the well casing. The water level indicator will be properly decontaminated between each monitor well following the procedures specified in Section 2.10.

2.4 Monitor Well Purging

The purpose of purging a monitor well is to remove stagnant water from the well casing and allow representative formation groundwater to accumulate within the well casing for sample collection. Monitor wells should be purged in order from highest to lowest groundwater elevations (i.e. upgradient to downgradient), or if contamination is known to be present, least contaminated to most contaminated, or an alternative procedure approved by the TCEQ. Purging will~~may~~ be accomplished by ~~either~~ removing three (3) well volumes (2.4.1). If excessive well recovery times or sample inconsistencies are experienced, purging ~~or~~ by "Low-Flow" techniques (2.4.2) may be used.

Care will be taken during purging to avoid introducing contaminants to the water in the well. All non-dedicated and non-disposable equipment used during purging will be decontaminated in accordance with the Equipment Decontamination section prior to use at the next monitor well. Clean equipment will be kept off the ground to prevent contamination by placing disposable plastic sheeting around each well before purging and sampling. The sheeting will be dedicated for each individual well and will not be reused at other well locations. A new pair of disposable gloves will be donned prior to purging each monitor well to reduce the possibility of cross-contamination between wells.

The water removed from each well during purging and decontamination water will be stored in dedicated drums placed next to each monitor well for proper disposal. The purge water may be disposed in the Landfill's Liquid Waste Solidification Facility or may be held until analytical data is reviewed to allow disposal of the water in a manner consistent with TCEQ directives.

Data collected prior to sampling will be recorded in the project field book, or on the field data sheet and will include weather conditions, the initial depth to water, measured well depth, height of the water column, well volume, pump and tubing volume, purging discharge rate, well purging time, and volume of water purged from the well. In addition, physical groundwater characteristics such as pH, conductivity, temperature, and turbidity readings will also be recorded for each well.

2.4.1 Purging Three Well Volumes

For removal of three well volumes, which is the default purging method to be used, the volume of water to be purged for one well volume can be calculated using the following formula:

V = (Total Depth – Depth to Water) x Gallons of Water per Foot (dependent upon well diameter)*

Where:

V = (1) well volume

*Gallons of Water per Foot = 0.163 for a 2" diameter well

0.653 for a 4" diameter well

Purging will be considered complete once a minimum of three (3) well volumes of water have been removed from the well or until dry. Any monitor well that is purged dry should be allowed to sufficiently recharge prior to the collection of groundwater samples. If the well is purged until dry, a recovery time of up to seven days between purging and sampling will be allowed, before declaring the well to be dry. Purged volumes may be measured using a calibrated bucket or drum. Purging will be accomplished with portable or dedicated pumps. However, if the pump is deemed inoperable, monitor wells may be purged using a bailer as an appropriate alternative. Sampling will be performed as specified below in the Sample Collection Section.

2.4.2 Low-Flow Purging

Purging and sampling may also be conducted using low-flow purging and sampling (also known as "minimal drawdown" or "micro-purge" sampling). The well is purged at a low rate until field parameters stabilize, and then a sample is obtained immediately. Low-flow purging may be utilized if it is believed that sampling disturbance is causing inconsistent analytical test results, or slow well recovery times are causing pumping of three well volumes to not be practicable. ~~The purpose of this technique is to sample the well with minimal disturbance in order to obtain the most representative~~ If it is determined that low-flow purging will be more satisfactory, the TCEQ will be notified by letter prior to changing from the three-volume default method.

~~groundwater sample. The well is purged at a low rate until field parameters stabilize, and then a sample is obtained immediately.~~

Purging and sampling will be conducted using dedicated low-flow pumps installed in each well (if low-flow purging and sampling is utilized). The well will be purged at approximately 0.1 to 0.5 liter/minute (the appropriate rate depends on the drawdown; additional discussion follows). Pumping rate may be adjusted as described below. The purged liquid will be pumped through a flow cell device that will be used to continuously monitor specific conductivity, pH, and temperature. Purging will be conducted until three consecutive readings spaced approximately three minutes apart indicate stabilization (i.e., pH = $\pm$ 0.2 units and conductivity $\pm$ 3%), and the minimum purge volume of two pump and tubing volumes have been removed. Sampling will then be conducted at the same flow rate as purging. All measurements and observations made during purging will be recorded in a log book or appropriate form.

Pumping rate will be adjusted as necessary based on the observed drawdown in the well. Drawdown will be measured and recorded approximately every two minutes during purging until water level stabilization, using an electric water level indicator capable of providing water level measurements within 0.01 foot or equivalent device. Pumping rate will be adjusted to maintain a maximum drawdown goal of 0.2 feet. The pumping rate will be adjusted as necessary for each well. Pumping rate will be determined with a graduated cylinder and a timer such as a watch. If drawdown in excess of 0.2 feet occurs, the well will be purged until 3 well volumes are removed or

requirements of 30 TAC §330.405(f)(5), and analytical results must be reported to the lowest concentration levels that can be reliably quantified.

The reporting laboratory shall comply with the following precision and accuracy criteria for each PQL:

Table III-F.2-0 – Laboratory Precision and Accuracy Criteria

Constituents/Chemicals of Concern	Precision (percent RSD)	Accuracy (percent recovery)
Metals	10	70-130
Volatiles	20	50-150
Semi-Volatiles	30	50-150

The precision and accuracy of the PQL initially will be determined from the PQLs reported over the course of a minimum of eight groundwater monitoring events. The results obtained from these events will be used to demonstrate that the PQLs meet the specified precision and accuracy limits. The PQL may be updated as more data becomes available but will not be changed from the TCEQ established value without the approval of the TCEQ. The PQL will be supported by analysis of a PQL check sample, consisting of a laboratory reagent grade sample matrix spiked with constituents/chemicals of concern at concentrations equal to or less than the PQL. At a minimum, a PQL check sample will be performed quarterly during the calendar year to demonstrate that the PQL continues to meet the specified limits for precision and accuracy. Analytical results from data below the limit of detection must be reported as less than the established PQL that meets the specified precision and accuracy requirements. If a PQL cannot be established according to the specified precision and accuracy limits, the owner or operator will ensure that the laboratory provides sufficient documentation to justify the alternative precision and accuracy limits. This information will be reported to the executive director by the owner or operator and will be evaluated case by case basis.

updated to include more recent observations as background data. Better estimates of the true background mean and variance can be obtained by including more data at a later time[2].

4.1.4 Detection Monitoring Reporting and Submittals

Detection monitoring sampling events will be conducted semi-annually. Upon receipt of the laboratory analytical report and subsequent review of the results, the data will be statistically evaluated within 60 days following the date of sampling to determine if an SSI over background has occurred for any 40 CFR Part 258 Appendix I constituent. If there is determined to be an SSI using statistical analysis for a 40 CFR Part 258 Appendix I constituent, the TCEQ and any local pollution agency with jurisdiction that has requested to be notified will be notified in writing within 14 days of the date of determination in accordance with §330.407(b) and a notice will also be placed in the site operating record. If an SSI is determined, a notice shall be placed in the operating record describing the increase and an assessment monitoring program must be established within 90 days of the date of the notice to TCEQ, or verification resampling may be conducted to confirm the SSI in accordance with §330.407(b)(2).

Verification resampling will be conducted for any 40 CFR Part 258 Appendix I constituent exhibiting an SSI to confirm the ~~exceedence~~exceedance. Per §330.407(b)(2), the results of the verification resampling will be completed and the results submitted to the executive director within 60 days of the determination of an initial exceedance (that is, within 120 days of the initial sampling for a detection monitoring event).

A notification of the confirmed SSI and the intent to submit an Alternate Source Demonstration (ASD) shall be provided in writing to the TCEQ and any local pollution agency with jurisdiction that has requested to be notified firmed SSI within 14 days of the date of determination in accordance with §330.407(b)(3)(A). A notice will also be placed in the site operating record.

If hazardous constituents are detected and confirmed; information, supporting data, and analysis to establish assessment monitoring per §330.409 will be provided to the TCEQ. Additionally, the

[2] U.S. Environmental Protection Agency, 1992. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance. Office of Solid Waste Management Division, U.S. EPA, Washington D.C.

annual monitoring events during the calendar year, and a groundwater contour map of the uppermost aquifer based at a minimum upon concurrent measurement in all monitoring wells. The annual report shall also include recommendations for changes to the monitoring program and any other information requested by the TCEQ.

4.2.5 Assessment of Corrective Measures and Remedy

If Appendix II constituents are determined to have been detected at a statistically significant level above its GWPS or MCL, or if a hazardous constituent has exceeded its concentration limit; the owner or operator shall conduct further evaluations consistent with the requirements of §330.409(g).

If there is reasonable cause to believe the contamination (i.e., exceedance above the GWPS) is derived from a source other than the solid waste management unit, an ASD may be submitted to the TCEQ within 90 days of determining the concentration was detected at a statistically significant level above its GWPS or MCL, or if a hazardous constituent has exceeded it concentration limit (exceedance). The ASD must be prepared and certified by a qualified groundwater scientist. The TCEQ must be notified within 14 days of the ~~exceedence~~exceedance determination of the intent to submit and ASD. The landfill will continue with assessment monitoring unless notified by the TCEQ that the ASD is determined to be unsatisfactory. The ASD should document the ~~exceedence~~exceedance is a result of an error in sampling, analysis, statistical evaluation, natural variation, or other potential alternate source. No filtering of samples for the ASD analysis will be allowed, and the TCEQ may require leachate analysis to support the ASD.

If the ASD is determined by the TCEQ to be unsatisfactory or if no ASD is submitted, the landfill shall proceed with the requirements of §330.409(g)(1). The landfill shall install at least one additional monitoring well between the well with the exceedance and the next adjacent wells along the point of compliance prior to the next sampling event and notify in writing all persons that own or occupy the land that directly overlies any part of the plume of contamination, if contamination has migrated off site. If necessary to characterize the nature and extent of the release, additional monitoring wells will be installed.

5.0 GROUNDWATER MONITORING SYSTEM

The groundwater monitoring system at the PERC is based on site specific technical information, and is designed to consist of a sufficient number of wells installed at approximate locations and depths to yield representative groundwater samples from the uppermost water bearing unit. A description of site geology, hydrogeology, groundwater flow, and the groundwater monitoring system pursuant to §330.403(a)(2) is provided in Part III, Attachment III-E~~F~~, Appendices III-E-1 and III-E-2. The design, as well as any revisions to the design, shall be certified by a qualified groundwater scientist. All parts of the groundwater monitoring system shall be operated and maintained so that they perform at least to design specifications.

If changes in the facility construction or operation or any changes in the adjacent property occur that affect or will likely affect the direction and rate of flow of the groundwater and the potential for detecting groundwater contamination from the landfill, it may be necessary to install additional monitoring wells or sampling points. If any revisions are required to the number of wells or sampling points, a modification to the site development plan will be required.

TABLE III-F.2-1
Typical Sampling, Preservation, and Storage
Procedures for Groundwater Monitoring Constituents

Parameter	Recommended Containers	Preservation	Maximum Holding Time	Minimum Volume
Heavy Metals (includes iron and manganese)	P, G	Acidify w/ HNO_3 to pH<2, 4°C	6 months except 28 days for Hg	1 liter
Calcium, Magnesium, Sodium, Potassium, Fluoride, Sulfate, Chloride, and Hardness	P, G	4°C	28 days	1 liter

Table III-F.2-3

Optional Groundwater Quality Indicator Parameters not Required for Detection Monitoring

Groundwater Quality Indicators*	Test Method
Sulfate	300.0
Ammonia	350.1
Chloride	300.0
Total Alkalinity	310.1
Hardness	2340B
Total Dissolved Solids	160.1
Nitrate	353.2
Iron (dissolved)	6010
Calcium (dissolved)	6010
Magnesium (dissolved)	6010