

# SAMPLE AND ANALYSIS PLANS (SAPs)

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## BACKGROUND:

### PURPOSE OF SAMPLE AND ANALYSIS PLAN

**A SAMPLE AND ANALYSIS PLAN (SAP) IS A DOCUMENT THAT DESCRIBES THE SAMPLE COLLECTION, HANDLING, AND ANALYSIS PROCEDURES TO BE USED AT A SITE. IT IS PREPARED FOR ALL SAMPLING ACTIVITIES THAT ARE PART OF AN INVESTIGATION OR REMEDIAL ACTION, UNLESS OTHERWISE DIRECTED BY A REGULATORY OVERSIGHT AGENCY AND EXCEPT FOR EMERGENCIES.**

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Sage determines the level of detail required, as the SAP may vary with the scope and purpose of the sampling activity. Within an SAP, Sage specifies procedures that ensure sample, handling, and analysis result in data of sufficient quality to plan and evaluate remedial actions at the site. Additionally, we include information necessary to ensure proper planning and implementation of sampling activities. Standard protocols or procedures are used in accordance with the appropriate regulatory agency requirements.

### **SITE-SPECIFIC INFORMATION**

Sage obtains initial site information that provides the rationale to determine the project requirements, scope and purpose. The introduction section in a SAP includes a brief description of the project, including the history, problem to be investigated, scope of sampling effort, and types of analyses required. Site information such as the sampling area and the region, state, or tribal area are addressed in this section. Sage identifies the responsible agency that may have issued a decree or an order requiring an SAP to adhere to standard protocols or procedures.

The project organization is addressed to designate project personnel or contractors with names and phone numbers. A quality assurance (QA) officer is assigned to oversee the implementation of the SAP, including whether specified quality control (QC) procedures

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are being followed. Ideally, this individual discusses QA issues with the project manager, but should not be involved in the data collection/analysis/interpretation/reporting process, except in a review or oversight capacity. If the project is small, another technical person may fulfill this role.

A statement of the specific problem describes the problem, including historical and recent information and data that may be relevant. Citizens' complaints, public agency inspections, and existing data are listed along with sources of provided information.

### **SITE BACKGROUND INFORMATION**

Sage gathers background information that provides an overview of the location, previous investigations, and the apparent problem(s) associated with the site or sampling area. This includes a description of the site or sampling area, including chemicals used on the site, site history, and past and present operations or activities that may have contributed to the suspected contamination.

Operational history might include a description of the owner(s) and/or operator(s) of the site or areas near the site, the watershed of interest, the sampling area; a description of past and current operations or activities that may have contributed to suspected contamination; a description of the processes involved in the operation(s) and the environmentally detrimental substances, if any, used in the processes; and a description of any past or present waste management practices. If it is a waste site, Sage identifies whether these processes have in the past or present generated hazardous waste. The type of hazardous waste is identified, along with how they were/are stored on the site or sampling area, and where they were/are ultimately disposed. If the sampling location is an ecosystem, the point or non-point sources is identified that may have affected the river, stream, lake or watershed.

Previous investigations and regulatory involvement (if applicable) is included in the site background information section, as well. Sage provides a summary of all previous sampling efforts at the site or sampling area, including sampling date(s); name of the party(ies) that conducted the sampling; local, tribal, state or federal government agency for which the sampling was conducted; a rationale for the sampling; the type of media sampled (e.g., soil, sediment, water); laboratory methods that were used; and a discussion of what is known about data quality and usability.

If groundwater sampling is within the SAP then geological information such as a description of the hydrogeology of the area and the direction of groundwater flow is provided. A description of what is known about the possible and actual impacts of the suspected environmental problem on human health or the environment is included in the site background information, as well.

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**PROJECT DATA QUALITY OBJECTIVES (DQOS)**

Data Quality Objectives (DQOs) are qualitative and quantitative statements for establishing criteria for data quality and for developing data collection designs. This section is crucial to SAP approval, since it defines what the data is used for and what quality of data are needed to make decisions. EPA's Guidance for the Data Quality Objectives Process (EPA QA/G-4, Final, September, 1994) should be consulted for more information.

DQOs cover the following items:

- Concisely describe the problem to be studied
- Identify what questions the study attempts to resolve and what actions (decisions) may result
- Identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement
- Define study boundaries and when and where data should be collected

DQOs are quantitative and qualitative criteria that establish the level of uncertainty associated with a set of data. They answer the question: How sure are you that the value of the data is what the analyses have determined them to be?

All the elements of the sampling event, from the sampling design through laboratory analysis and reporting, affect the quality of the data. The project manager or other decision maker identified earlier in the project organization section must make the decision as to what level of uncertainty is acceptable or appropriate. Depending on what the contaminants of concern are, what effect they may have on human and environmental health, and what levels are of concern, data may need to be legally defensible or capable of answering a simple "presence-absence" question.

In addition to DQOs, data quality is also defined by data quality indicators, which are discussed in the next section. More sophisticated DQO discussions involve defining null testing hypotheses and confidence intervals. These should be considered depending on project decision making needs, but such discussions are generally not expected in one-time event SAPs.

Sage describes the purpose of the environmental investigation in qualitative terms and how the data will be used. All measurements are made on an analyte-specific basis in whatever medium (i.e., soil, sediment, water) is to be sampled.

Data quality indicators (DQIs) are defined specifically for the project and the level of uncertainty associated with each measurement is defined. Values assigned to the DQIs (accuracy, precision, completeness, representativeness, comparability, and method detection limits) refer to QC criteria established for various aspects of data gathering, sampling, or analysis activity.

### **SAMPLING RATIONALE**

Depending on the nature of the site background information, Sage carefully considers existing or potential contamination when providing an SAP. For each sampling event, the SAP must describe the sampling locations, the media to be sampled, and the analytes of concern at each location. A rationale is then provided justifying these choices. Individual sections are provided with sampling rationale specific to the media to be sampled.

Depending on the media to be sampled, Sage provides a general overview of the sampling event, along with a rationale for the event. For instance, for a soil sampling event, a rationale for choosing each sampling location at the site is presented along with the depths at which the samples are to be taken, if relevant. Analytes of concern are listed for each location and a rationale for why the specific chemical or group of chemicals is provided. For a groundwater sampling event, a description of the wells to be sampled and how the samples are collected (e.g., disposable bailers, low flow/minimal drawdown, submersible pumps), including the depths at which the samples are to be taken, is provided. The same descriptions, along with figures for sample locations, are presented for all media types (e.g., sediment, biological, surface water).

### **FIELD METHODS AND PROCEDURES**

A description of the methods and procedures that are used to accomplish the sampling goals are addressed in the SAP. All sampling and analytical methods employed are conducted in accordance with EPA-SW-846: Test Methods for Evaluating Solid Waste Physical and Chemical Methods. Personnel involved in sampling must wear clean, disposable gloves of the appropriate type. Generally, we provide a copy of our sampling SOP along with the SAP, but site-specific and/or sample-specific procedures are addressed, as needed. Depending on the media to be sampled, a step-by-step list of procedures is also addressed to ensure that all sampling standards are achieved and any confusion as to sampling procedures is eliminated.

Standard procedures for the sampling of groundwater cover the following:

- Lower the water level indicator or interface probe to the static water level within the well. Measure and record on the field log, the depth to water from the top of casing at the designated mark located on the north side of each well. Measurements are taken and recorded to the nearest hundredth of a foot. Retrieve the water level indicator and decontaminate with a clean paper towel saturated with distilled water and soap.
- Calibrate the water quality instrument prior to sampling the first well onsite. Calibration is performed daily.
- Review to approximate total depth (from well construction logs) of the well to determine the depth to lower the pump (middle of the screened interval).

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- Connect the proper size dedicated tubing to the pump (with a flow control box) and lower the submersible pump to the middle of the screened interval of the well. Be careful not to place the pump on the bottom of the well, as that may cause silt to become entrained in the sample.
- Connect the discharge tubing to the inflow valve of the flow-thru groundwater quality meter.
- Connect a separate piece of tubing to the outflow valve of the flow-thru cell and place it into a drum for collection of the purge water.
- Connect the pump to a 12-Volt power supply and turn on the pump, controlling the flow rate of purging to approximately 0.1 gpm.
- Place the discharge tubing into a collection drum for later disposal.
- Collect groundwater quality parameters, one every two to three minutes, until the water quality parameters indicate stability (3 readings within 10% of the previous value). This indicates that the well has been evacuated of stagnant water and that formation water is being sampled.
- If the well is purged to dryness before the groundwater parameters have stabilized, allow the well to recover to its approximate static water level prior to collection of a groundwater sample, then using a dedicated disposable bailer, collect the sample.
- If the well stabilizes prior to becoming dry, disconnect the intake tubing from the flow-thru water quality parameter instrument, while holding the tubing over a bucket or drum to collect the purge water.
- Select the sample container and allow the groundwater to pump at a low flow rate into the sample container(s).
- Complete the information on the sample label for each container including the sample site, sample ID, time and date of collection, name of person collecting the sample, type of analysis, and preservative type. Do not allow the sample container to be overfilled or spill preservative from the bottle.
- Log the sample on a laboratory supplied chain-of-custody, place in a cooler maintained with ice until delivery to the contract laboratory.
- Remove pump and tubing from the well for decontamination and measure the total depth of the well. Record the depth on the field log for comparison to the construction depth during data analysis to confirm the well screen has not become silted or needs to be redeveloped.
- Note the volume of water purged on field notes.

### **FIELD EQUIPMENT**

All equipment to be used in the field to collect samples, including decontamination equipment, if required, is presented. The procedures by which field equipment is

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prepared for sampling, including calibration standards used, frequency of calibration, and maintenance routines, are discussed, along with the location of all equipment maintenance and calibration records for the project.

#### **DISPOSAL OF RESIDUAL MATERIALS**

A description of the type(s) of investigation derived wastes (IDW) that are generated during the sampling event is presented. This section in an SAP is conditional; the EPA recognizes that IDW may not be generated in all sampling events. Depending upon site-specific conditions and applicable federal, state, and local regulations, other provisions for IDW disposal may be required. Sage provides information as to the nature of IDW, the disposal method and destination of IDW, and all applicable PPE to be used when dealing with IDW.

#### **DOCUMENTATION**

A detailed description of all recordkeeping procedures is presented in the SAP, including all logbooks, preprinted forms, photographs, or other documentation. The procedures for the use of sample chain-of-custody forms, custody seals, packing, and shipping are all presented in the documentation section of a SAP. Required documentation within a SAP for a groundwater sampling event provides the following information:

- Date of sampling event
- Name of sampler
- Sample location
- Time of sample collection
- Sampling method
- Air temperature and other climate conditions
- Sample observations
- Sample number
- Field observations
- Groundwater quality parameters
- Approximate flow rate
- Instrument calibration
- Tailgate safety documents
- Daily activities logs
- Flow rates
- Purge volumes
- Problems with sampling
- Presence of PSH
- Summary of equipment

#### **HEALTH AND SAFETY**

Sage follows a stringent internal health and safety program that is tailored to any type of project or project location. All project-specific health and safety procedures must be followed in the field, including safety equipment and clothing that may be required, explanation of potential hazards that may be encountered, and location and route to the nearest hospital or medical treatment facility. A copy of Sage's health and safety plan is included in the appendix of the SAP.

**SUMMARY:**

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SAGE'S  
APPROACH TO  
SAPs

Sage's approach to SAPs involves comprehensive planning and the careful consideration of all project elements. Our SAPs are crafted to meet the needs of any detection monitoring, compliance monitoring, and groundwater/soil/waste/biological sampling events. Sage maintains the highest QA standards and uses TCEQ/EPA approved methods when assembling a SAP to ensure that all reporting requirements and project objectives are met.