SAMPLING AND ANALYSIS PLAN (SAP)
GUIDANCE AND TEMPLATE

VERSION 1, EPA ANALYTICAL SERVICES USED

R9QA/001.1
April, 2000

This Sampling and Analysis Plan (SAP) guidance and template is intended assist organization in documenting the procedural and analytical requirements for a one-time or time-limited projects involving the collection of water, soil, sediment, or biological samples taken to characterize areas of potential environmental contamination. It combines, in a short form, the basic elements of a Quality Assurance Project Plan (QAPP) and a Field Sampling Plan (FSP). Once prepared and approved it will meet the requirements for any U.S. Environmental Protection Agency (EPA) Region 9 funded project in which environmental measurements are to be taken.

The format is designed to accommodate projects of limited scope and is predicated on the assumption that the work will be going to the Region 9 Laboratory or other EPA funded laboratory rather than a private laboratory under contract to the organization writing the SAP. If a non-EPA laboratory will be used, Version 2 (R9QA/002) of this template should be used. It is intended to be used for projects generating a limited number of samples (note that these samples may be analyzed by more than one analytical method, e.g., metals, nitrate, and pesticides) which will be collected over a period of not more than 14 days. This template is not intended to be used for on-going monitoring events, or for remediation or removal activities. Exceptions to all of these requirements will be considered on a case by case basis, but they should be discussed with Region 9 QA Office staff before the template is used and before the SAP is submitted for approval. The primary programs using this guidance are expected to be (but not limited to) Superfund Site Assessment projects, Brownfields projects, tribal projects, Clean Water Act projects, and RCRA (Resource Conservation and Recovery Act) projects. It can be used by state, municipal and local, contractor, non-profit, organizations and by EPA staff. Not all sections will apply to all organizations.

This guide is to be used as a template. It provides item-by-item instructions for creating a SAP and includes example language which can be used with or without modification. More complete information is provided for completing the sections describing sampling procedures, since it is implicit in the use of this template that EPA's analytical procedures are acceptable to the organization generating the plan. If information on these sampling procedures is needed, QA Office staff should be

contacted. If these procedures will not meet project needs, the organization can substitute a description of its own sampling procedures or provide copies of its sampling SOPs. Other alternatives should be discussed with QA Office staff.

If the sections in the SAP are appropriate for the project, they may be used verbatim or modified as needed to reflect project- and sampling-specific requirements. An electronic version of the template in WordPerfect is available and it is expected that it, rather than a hardcopy version of the template, will be used to prepare the SAP.

The U.S. EPA Region 9 Quality Assurance Office is available to provide assistance in completing the SAP. Contact Dr. David Taylor at 415-744-1497, or Ms. Gail Jones at 415-744-1498.

The format of the template is as follows:

All informational and instructional language will be shaded and is to be deleted from the final SAP.

Tutorial information is presented in *italic* type. This information includes definitions and background information pertaining to a given section of the SAP and is to be deleted from the final document.

Specific instructions are given inside brackets [in normal type]. The brackets and the instructions inside the brackets should be deleted from the final document.

Suggested text which may be included in the SAP is presented in normal type. This text can be used, modified, or deleted depending on the nature of the project. For example, delete the discussion of soil sampling if only groundwater will be sampled.

If the use of an SOP is appropriate, the SOP should be included as an appendix to the final SAP and referenced in the appropriate section of the SAP.

An underlined blank area _____ indicates that text should be added. The underlined area is not meant to imply how much text should be added, only that it is a place that the plan writer should be adding information. Adjust the space provided as necessary to completely address each section. The underlined area should be deleted (i.e., do not underline added text).

Examples or choices are given in [brackets] following the blank. If appropriate, select one and delete the others.

If a given section does not apply, it is recommended (but not required) that the section state "Not applicable," or "Does not apply," under the section heading. By not deleting the section, the writer avoids having to renumber sections. However, sections can be removed altogether and the remaining sections renumbered if the organization prefers.

Sampling and Analysis Plan for

[Title of Project]

_____
_____
_____
_____

[Name and Address of Organization Here]

_____
_____

_____
Date

[Name of Organization] Project Manager _____

[Name of Organization] QA Manager _____

For EPA use:

Approved by EPA Project Manager: Date:

Expedited Review? G Yes G No

Received by QA Office: Date:

_____ _____
Reviewed by: Date:

_____ _____
Approved: Date:

_____ _____
Region 9 Quality Assurance Manager

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1.0 INTRODUCTION

[This section should include a brief description of the project, including the history, problem to be investigated, scope of sampling effort, and types of analyses that will be required. These topics will be covered in depth later so do not include a detailed discussion here.]

_____

_____

_____

1.1 Site Name or Sampling Area

[Provide the most commonly used name of the site or sampling area.]

_____

1.2 Site or Sampling Area Location

[Provide a general description of the region, state or tribal area in which the site or sampling area is located. Detailed sampling location information should be provided later in Section 2]

_____

_____

_____

1.3 Responsible Agency

[Provide a description of the organization conducting the sampling.]

1.4 Project Organization

[Fill out the table. Provide the name and phone number(s) of the person(s) and/or contractor working on the sampling project as listed in the table. The table can be modified to include titles or positions appropriate to the specific project. Delete personnel or titles not appropriate to the project]

It should be noted that it is the responsibility of the Quality Assurance (QA) Officer to oversee the implementation of the Sampling and Analysis Plan or QA Plan if one has been prepared, including whether specified quality control (QC) procedures are being followed as described. Ideally, this individual should discuss 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.

Title/Responsibility	Name	Phone Number
EPA Project Manager		
Project Manager		
Staff		
Quality Assurance Manager		
Contractor (Company Name)		
Contractor Staff		

1.5 Statement of the Specific Problem

[In describing the problem, include historical, as well as recent, information and data that may be relevant. List and briefly outline citizens' complaints, public agency inspections, and existing data. Include sources of information if possible.]

_____

_____

_____

2.0 BACKGROUND

This section provides an overview of the location, previous investigations, and the apparent problem(s) associated with the site or sampling area.

[Provide a brief description of the site or sampling area, including chemicals used on the site, site history, past and present operations or activities that may have contributed to the suspected contamination, etc.]

_____

_____

_____

_____

2.1 Site or Sampling Area Description [Fill in the blanks.]

[Two maps of the area should be provided: the first (Figure 2.1), on a larger scale, should place the area within its geographic region; the second (Figure 2.2), on a smaller scale, should mark the sampling site or sampling areas within the local area. Additional maps may be provided, as necessary, for clarity. Maps should include a North arrow, groundwater flow arrow (if appropriate), buildings or former buildings, spill areas, etc. If longitude or latitude information is available, such as from a Global Positioning System (GPS), provide it. Sampling locations can be shown in Figure 2.2.]

The site or sampling area occupies _____ [e.g., acres or square feet] in a _____ [e.g., urban, commercial, industrial, residential, agricultural, or undeveloped] area. The site or sampling area is bordered on the north by _____, on the west by _____, on the south by _____, and on the east by _____. The specific location of the site or sampling area is shown in Figure 2.2.

The second paragraph (or set of paragraphs) should describe historic and current on-site structures and should be consistent with what is presented in Figure 2.2.

_____

_____

_____

[Depending on the nature of the project, some of the following sections may not be applicable. If this is the case, do not delete the section. Instead enter "Not Applicable" or other text to indicate that the section does not apply or that the information is not available.]

2.2 Operational History

[As applicable, describe in as much detail possible (i.e., use several paragraphs) the past and present activities at the site or sampling area. The discussion might include the following information: 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, etc. [Present this information chronologically]; 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; a description of any past and present waste management practices. If a waste site, were/are hazardous wastes generated by one or more of the processes described earlier? If so, what were/are they, how and where were/are they stored on the site or sampling area, and where were/are they ultimately disposed of? If an ecosystem, what point and non-point sources may have affected the river, stream, lake or watershed? Approximately what level of contamination is expected (high = >10 mg/L or mg/Kg; medium = 10 mg/L or mg/Kg to 10 ug/L or ug/Kg; low = <10 ug/L or ug/Kg)?]

2.3 Previous Investigations and Regulatory Involvement [if applicable]

[Summarize all previous sampling efforts at the site or sampling area. Include the 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. The summaries should be presented in subsections according to the media that were sampled (e.g., soil, water, etc.) and chronologically within each medium. Attach reports or summary tables of results or include in appendices if necessary.]

2.4 Geological Information [groundwater sampling only]

[Provide a description of the hydrogeology of the area. Indicate the direction of groundwater flow, if known.]

2.5 Environmental and/or Human Impact

[Discuss what is known about the possible and actual impacts of the possible environmental problem on human health or the environment.]

_____

_____

_____

3.0 PROJECT DATA QUALITY OBJECTIVES

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 will be 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 should cover the following items:

- *Concisely describe the problem to be studied.*
- *Identify what questions the study will attempt 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.*

Most projects utilizing this template are small so that defining action levels and data quality indicators (DQIs) for the field and laboratory measurements used on the project are sufficient. DQIs define criteria for calibration and quality control (QC) for field and laboratory methods. DQIs are discussed more thoroughly below.

3.1 Project Task and Problem Definition

[Describe the purpose of the environmental investigation in qualitative terms and how the data will be used. Generally, this discussion will be brief and generic. Include all measurements to be made on an analyte specific basis in whatever medium (soil, sediment, water, etc.) is to be sampled. This discussion should relate to how this sampling effort will support the specific decisions described in Section 3.2., DQOs, below. If this project is for the purpose of scoring a site using the Hazardous Ranking System under Superfund, refer to Appendix 1.]

_____

_____

_____

_____

3.2 Data Quality Objectives (DQOs)

Data quality objectives (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 are 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.

This section should describe decisions to be made based on the data and provide criteria on which these decisions will be made. Inclusion of one or more tables is recommended; tables which contain all the contaminants of concern, their associated action levels, and the source of the action level (regulation, health based criteria, water quality standards, etc.) If a contaminant does not have an action level, or will not be used in decision making, the text should discuss how the data for that contaminant will be used. The use of "...if...then" statements is recommended. Note that decisions do not have to involve regulatory or legal action (and for one-time SAP projects, few are expected to). Some examples: "If any contaminant is found above the levels specified in Table ___, but below 10X that level, then it will be monitored on a yearly basis. If a contaminant is found above 10X the action level, then corrective action in the form of source investigation will be initiated," or: "If contaminants are found above the action level, then a Phase II Site Investigation will be initiated," or: "If contamination is found above the action level for compound X, then it will be bioremediated in situ. Locations containing metals above the action limit will be excavated and retested."

[Discuss Data Quality Objectives, action levels, and decisions to be made based on the data here.]

_____

_____

_____

3.3 Data Quality Indicators (DQIs)

Data quality indicators (accuracy, precision, completeness, representativeness, comparability, and method detection limits) refer to quality control criteria established for various aspects

of data gathering, sampling, or analysis activity. In defining DQIs specifically for the project, the level of uncertainty associated with each measurement is defined.

The values that are to be assigned to the quantitative data quality indicators (accuracy, precision, completeness) and statements concerning the qualitative indicators (representativeness and comparability) are determined by the answers to the questions in Section 3.2. If EPA schedules the analytical work, it generally defines DQIs for its laboratories, but the organization writing the SAP should include the appropriate tables to make the SAP complete and to acknowledge that it understands and agrees to the DQIs which will be used for the project. DQIs for work performed by the Contract Laboratory Program will be defined in the organic and inorganic statements of work (SOWs). The QA Office should be consulted to see what information should be included in EPA lead projects one-time SAPs. Definition of the different terms are provided below:

> *Accuracy is the degree of agreement of a measurement with a known or true value. To determine accuracy, a laboratory or field value is compared to a known or true concentration. Accuracy is determined by such QC indicators as: matrix spikes, surrogate spikes, laboratory control samples (blind spikes) and performance samples.*
>
> *Precision is the degree of mutual agreement between or among independent measurements of a similar property (usually reported as a standard deviation [SD] or relative percent difference [RPD]). This indicator relates to the analysis of duplicate laboratory or field samples. An RPD of <20% for water and <35% for soil, depending upon the chemical being analyzed, is generally acceptable. Typically field precision is assessed by co-located samples, field duplicates, or field splits and laboratory precision is assessed using laboratory duplicates, matrix spike duplicates, or laboratory control sample duplicates).*

Completeness is expressed as percent of valid usable data actually obtained compared to the amount that was expected. Due to a variety of circumstances, sometimes either not all samples scheduled to be collected can be collected or else the data from samples cannot be used (for example, samples lost, bottles broken, instrument failures, laboratory mistakes, etc.). The minimum percent of completed analyses defined in this section depends on how much information is needed for decision making. Generally, completeness goals rise the fewer the number of samples taken per event or the more critical the data are for decision making. Goals in the 75-95% range are typical.

Representativeness is the expression of the degree to which data accurately and precisely represent a characteristic of an environmental condition or a population. It relates both to the area of interest and to the method of taking the individual sample. The idea of representativeness should be incorporated into discussions of sampling design. Representativeness is best assured by a comprehensive statistical sampling design, but it is recognized that this is usually outside the scope of most one-time events. Most one time SAPs should focus on issues related to judgmental sampling and why certain areas are included or not included and the steps being taken to avoid either false positives or false negatives.

Comparability expresses the confidence with which one data set can be compared to another. The use of methods from EPA or "Standard Methods" or from some other recognized sources allows the data to be compared facilitating evaluation of trends or changes in a site, a river, groundwater, etc. Comparability also refers to the reporting of data in comparable units so direct comparisons are simplified (e.g., this avoids comparison of mg/L for nitrate reported as nitrogen to mg/L of nitrate reported as nitrate, or ppm vs. mg/L discussions).

Detection Limit(s) (usually expressed as method detection limits (MDLs) or Quantitation Limit(s) for all analytes or compounds of interest for all analyses requested must be included in this section. These limits should be related to any decisions that will be made as a result of the data collection effort. A critical element to be addressed is how these limits relate to any regulatory or action levels that may apply.

DQI tables are available from the QA Office for most routinely ordered methods. These tables can be attached to the SAP and referenced in this section. If an organization, its contractor, or its laboratory wish to use different limits or acceptance criteria, the table should be modified accordingly. SOPs should be included for methods not covered by the DQI tables or they can be submitted in lieu of the tables. Due to resource constraints, generally only the DQI aspects of these SOPs will be evaluated.

[Provide or reference DQI tables here]

_____

_____

_____

3.4 Data Review and Validation

This section should discuss data review, including what organizations or individuals will be responsible for what aspects of data review and what the review will include. Region 9 has adopted a tiered approach to data review, and any data generated by the EPA analytical system is subject to this system. If EPA will be used, the SAP should specify what tier is to be used for this project. The SAP should discuss the process by which the evaluation of data quality will be made. Describe how data that do not meet data quality objectives will be designated. Assistance is available from the QA Office.

If data need to be legally defensible, data packages and data validation may be required. (EPA defines validation as a 3rd party review of all laboratory data based on strict protocols). Data reviewed include raw data such as standards log books, extractions logs, instrument print outs, chromatograms (if applicable), mass spectra (if applicable), etc. Calibration data, sample analysis data, and quality control data are all evaluated.) Details on validation are available from the QA Office, but a brief summary follows:

- *Tier 1A involves a review of the QC data for the project, with up to 10% of the data being validated. Validation candidates are chosen based on the initial screening or higher level hits.*

- *Tier 1B involves a review using the EPA's automated data validation system, CADRE. This review is limited to data in the correct electronic format and only covers analyses for volatile organic compounds, semivolatile organic compounds, organochlorine pesticides, metals, and cyanide.*

- *Tier 2 involves a selected validation based on several factors which should be defined in the DQOs for the project. Candidates might be a specific area within the sampling area, specific analytes or analyses of concern critical to decision making, potential costs of certain types of resampling, or some other factor.*

- *Tier 3 involves a traditional full validation.*

There is no requirement that all data adhere to the same Tier; the project can mix and match depending on DQOs. If a project involves a mix of EPA analytical services and services contracted by the organization writing the SAP, this section should describe how the data from the non-EPA source will be reviewed and/or validated. It is recommended that, if validation will be a part of data review, that SOP(s) from the organization which will perform the validation be attached. Alternatively, the QA Office

Data Review Team can be requested to review the validating organization's validation SOP on a generic basis. Once reviewed to ensure it is consistent with Region 9 protocols, it can be referenced in all future SAPs.

[Discuss data review and data validation here including what organizations or individuals will be responsible for what aspects of data review and what the review will include. This section should also discuss how data that do not meet data quality objectives will be designated, flagged, or otherwise handled. Possible corrective actions associated with the rejection of data; such as not using data in decision making, reanalysis, resampling, no action but monitor the data more closely next quarter, etc.; also need to be addressed]

_____

_____

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_____

_____

3.5 Data Management

[Provide a list of the steps that will be taken to ensure that data are transferred accurately from collection to analysis to reporting. Discuss the measures that will be taken to review the data collection processes, including field notes or field data sheets; to obtain and review complete laboratory reports; and to review the data entry system, including its use in reports. A checklist is acceptable.]

_____

_____

3.6 Assessment Oversight

[Describe the procedures which will be used to implement the QA Program. This would include oversight by the Quality Assurance Manager or the person assigned QA responsibilities. Indicate how often a QA review of the different aspects of the project, including audits of field and laboratory procedures, use of performance samples, etc., will take place. Describe what authority the QA Manager or designated QA person has to ensure that identified field and analytical problems will be corrected and the mechanism by which this will be accomplished.]

4.0 SAMPLING RATIONALE

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 should then be provided justifying these choices. The following sections are subdivided on a media specific basis among soil, sediment, water, and biological media. Other media should be added as needed. This section is crucial to plan approval and should be closely related to previously discussed DQOs.

4.1 Soil Sampling

[Provide a general overview of the soil sampling event. Present a rationale for choosing each sampling location at the site or sampling area and the depths at which the samples are to be taken, if relevant. If decisions will be made in the field, provide details concerning the criteria that will be used to make these decisions (i.e., the decision tree to be followed). List the analytes of concern at each location and provide a rationale for why the specific chemical or group of chemicals (e.g.,

organochlorine pesticides) were chosen. Include sampling locations in Figure 2.2 or equivalent.]

_____

_____

_____

4.2 Sediment Sampling

[Provide a general overview of the sediment sampling event. Present a rationale for choosing each sampling location at the site or sampling area and the depths or area of the river, stream or lake at which the samples are to be taken, if relevant. If decisions will be made in the field, provide details concerning the criteria that will be used to make these decisions (i.e., the decision tree to be followed). List the analytes of concern at each location and provide a rationale for why the specific chemical or group of chemicals (e.g., organochlorine pesticides) were chosen. Include sampling locations in Figure 2.2 or equivalent.]

_____

_____

_____

4.3 Water Sampling

[Provide a general overview of the water sampling event. For groundwater, describe the wells to be sampled or how the samples will be collected (e.g., hydro punch), including the depths at which the samples are to be taken. For surface water, describe the depth and nature of the samples to be collected (fast or slow moving water, stream traverse, etc.). Present a rationale for choosing each sampling location or sampling area. If decisions

will be made in the field, provide details concerning the criteria that will be used to make these decisions (i.e., the decision tree to be followed). List the analytes of concern at each location and provide a rationale for why the specific chemical or group of chemicals (e.g., organochlorine pesticides) were chosen. For microbiological samples, discuss the types of bacterial samples being collected. Include sampling locations in Figure 2.2 or equivalent.]

_____

_____

_____

4.4 Biological Sampling

[For each of the two types of events identified, provide a general overview of the biological sampling event. Present a rationale for choosing each sampling location at the site or sampling area, including the parameters of interest at each location. If decisions will be made in the field, provide details concerning the criteria that will be used to make these decisions (i.e., the decision tree to be followed).

_____

_____

_____

4.4.1 Biological Samples for Chemical Analysis

[For sampling where flora or fauna will be analyzed for the presence of a chemical (e.g. fish collected for tissue analysis), explain why the specific chemical or group of chemicals (e.g., metals, organochlorine pesticides, etc.) is included. List the types of samples to be collected (e.g., fish, by species or size,

etc.) and explain how these will be representative. Include sampling locations in Figure 2.2 or equivalent.]

_____

_____

_____

4.4.2 Biological Sample for Species Identification and Habitat Asessment

[If the purpose of the sampling is to collect insects or other invertebrates or to make a habitat assessment, a rationale for the sampling to take place should be provided. For example, what species are of interest and why?]

_____

_____

_____

5.0 REQUEST FOR ANALYSES

EPA schedules analytical support for the project depending on several factors including the analyses requested, analytes of concern, turnaround times, available resources, available laboratories, etc. Ideally, these options include Contract Laboratory Program Analytical Services (CLPAS) (Superfund and Brownfields projects only), the Region 9 Laboratory in Richmond, California, and commercial laboratories under contract to Region 9. The Region 9 QA Office determines where samples will be sent. The SAP should not contain this information unless the Regional Sample Control Coordinator has indicated in advance where the samples will go. If samples will be sent through Region 9 and also to another organization with which the sampling organization has established a contract, this section should make it clear which samples go to EPA and which do not. Field analyses for pH,

conductivity, turbidity, or other field tests should be discussed in the sampling section. Field measurements in a mobile laboratory (for example, the Field Analytical Support Program (FASP) laboratory) should be discussed here and differentiated from samples to be sent to a fixed laboratory. Field screening tests (for example, immunoassay tests) should be discussed in the sampling section, but the confirmation tests should be discussed here and the totals included in the tables.

[Complete the following narrative subsection concerning the analyses for each matrix. In addition, fill in Tables 5-1 through 5-5, as appropriate. A Request for Analyses (RFA) table must be included for each matrix to be sampled. Example RFA tables for each matrix are included with this SAP template. Each table must be completed to list analytical parameters for each type of sample. Include information on container types, sample volumes, preservatives, special handling and analytical holding times for each parameter. Quality Control (QC) samples (blanks, duplicates, splits, and laboratory QC samples, see Section 10 for description) should be indicated in the column titled "Special Designation." The extra volume needed for laboratory QC samples (for water samples only) should be noted on the table. The tables provided do not have to be used, but the critical information concerning the number of samples, matrix, analyses requested and QC sample identification must be provided in some form or work cannot be scheduled by EPA. The selected analyses must be consistent with earlier discussions concerning DQOs and analytes of concern. DQI information for the methods should be discussed in Section 10 on quality control requirements.]

5.1. Analyses Narrative

[Fill in the blanks. Provide information for each analysis requested. Delete the information below as appropriate. Include any special requests, such as fast turn-around time (2 weeks or less), specific QC requirements, or modified sample preparation techniques in this section. An example of the narrative follows.]

As enumerated in Table 5.__, ____[Indicate matrix, e.g., soil] samples will be taken at ____[State total number of locations] locations. _____["Single" or "Double" depending on laboratory requirements] volume ____[matrix] samples collected at the following sample locations will be identified for use as laboratory QC samples: _____[QC sample numbers]. Duplicate ____[matrix] samples will be collected at the following sample locations: _____
[Indicate locations for sample duplicates]. [A rationale for the choice of sample locations for QC should be provided in Section 10].

As shown in Table 5.___, each _____[indicate matrix] sample (including laboratory QC samples) will be analyzed for _____[describe requested analyses].

_____

_____

_____

6.0 FIELD METHODS AND PROCEDURES

In the general introductory paragraph to this section, there should be a description of the methods and procedures that will be used to accomplish the sampling goals, e.g., "...collect soil, sediment and water samples." It should be noted that personnel involved in sampling must wear clean, disposable gloves of the appropriate type. The sampling discussion should track the samples identified in Section 4.0 and Table(s) 5-1, 5-2, 5-3, or 5-4. A general statement should be made that refers to the sections containing information about sample tracking and shipping (Section 7). Provide a description of sampling procedures. Example procedures are provided below, but the organization's own procedures can be used instead. In that case, attach a copy of the applicable SOP. Some sampling procedures are available from EPA. Contact the QA Office or visit the Region 9 laboratory's web page.

6.1 Field Equipment

6.1.1 List of Equipment Needed

[List all the equipment that will be used in the field to collect samples, including decontamination equipment, if required. Discuss the availability of back-up equipment and spare parts.]

_____

_____

_____

_____

6.1.2 Calibration of Field Equipment

[Describe the procedures by which field equipment is prepared for sampling, including calibration standards used, frequency of calibration and maintenance routines. Indicate where the equipment maintenance and calibration record(s) for the project will be kept.]

_____

_____

_____

_____

6.2 Field Screening

In some projects field screening methods may be used in conjunction with confirmation samples analyzed in a fixed laboratory. This section should describe these methods or

reference attached SOPs. Soil gas or immunoassay kits are two examples of common field screening methods.

[Describe any field screening methods to be used on the project here including how samples will be collected, prepared, and analyzed in the field. Include in an appendix, as appropriate, SOPs covering these methods. Confirmation of screening results should also be described. The role of the field screening in decision making for the site should also be discussed here if it has not been covered previously.]

_____

_____

_____

6.3 Soil

6.3.1 Surface Soil Sampling

[Use this subsection to describe the collection of surface soil samples that are to be collected within 6-12 inches of the ground surface. Specify the method (e.g., hand trowels) that will be used to collect the samples and use the language below or reference the appropriate sections of a Soil Sampling SOP.]

[If exact soil sampling locations will be determined in the field, this should be stated. The criteria that will be used to determine sampling locations, such as accessibility, visible signs of potential contamination (e.g., stained soils, location of former fuel storage tank, etc.), and topographical features which may indicate the location of hazardous substance disposal (e.g., depressions that may indicate a historic excavation) should be provided.]

Exact soil sampling locations will be determined in the field based on accessibility, visible signs of potential contamination (e.g., stained soils), and topographical features which may

indicate location of hazardous substance disposal (e.g., depressions that may indicate a historic excavation). Soil sample locations will be recorded in the field logbook as sampling is completed. A sketch of the sample location will be entered into the logbook and any physical reference points will be labeled. If possible, distances to the reference points will be given.

[If surface soil samples are to be analyzed for organic (non-volatile compounds and other analytes, use this paragraph; otherwise delete.]

Surface soil samples will be collected as grab samples (independent, discrete samples) from a depth of 0 to ___inches below ground surface (bgs). Surface soil samples will be collected using a stainless steel hand trowel. Samples to be analyzed for volatile organic compounds will be collected first (see below). Samples to be analyzed for _____ [List all analytical methods for soil samples except for volatile organic compounds] will be placed in a sample-dedicated 1-gallon disposable pail and homogenized with a trowel. Material in the pail will be transferred with a trowel from the pail to the appropriate sample containers. Sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being closed to prevent potential contaminant migration to or from the sample. Sample containers will be closed as soon as they are filled, chilled to 4°C if appropriate, and processed for shipment to the laboratory.

[If surface soil samples are to be analyzed for volatile organic compounds (VOCs), use this paragraph; otherwise delete.]

Surface soil samples for VOC analyses will be collected as grab samples (independent, discrete samples) from a depth of 0 to ___[inches or feet] below ground surface (bgs). Surface soil samples will be collected using a 5 gram Encore sampling device, and will be collected in triplicate. Samples will be sealed using the Encore sampler and a zip lock bag or else transferred directly from the sampler into a VOA vial containing either 10

mLs of methanol or sodium bisulfate solution. Sample containers will be closed as soon as they are filled, chilled immediately to 4°C before wrapping them in bubble wrap, and processed them for shipment to the laboratory.

[For surface soil samples which are not to be analyzed for volatile compounds, use this paragraph; otherwise delete.]

Surface soil samples will be collected as grab samples (independent, discrete samples) from a depth of 0 to ___[inches or feet] below ground surface (bgs). Surface soil samples will be collected using a stainless steel hand trowel. Samples will be placed in a sample-dedicated 1-gallon disposable pail and homogenized with a trowel. Material in the pail will be transferred with a trowel from the pail to the appropriate sample containers. Sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being closed to prevent potential contaminant migration to or from the sample. Sample containers will be closed as soon as they are filled, chilled if appropriate, and processed for shipment to the laboratory.

_____

_____

_____

_____

6.3.2 Subsurface Soil Sampling

[Use this subsection for subsurface soil samples that are to be collected 12 inches or more below the surface. Specify the method (e.g., hand augers) that will be used to access the appropriate depth and then state the depth at which samples will be collected and the method to be used to collect and then transfer samples to the appropriate containers or reference the

appropriate sections of a Soil Sampling SOP. If SOPs are referenced, they should be included in an Appendix.]

[If exact soil sampling locations will be determined in the field, this should be stated. The criteria that will be used to determine sampling locations, such as accessibility, visible signs of potential contamination (e.g., stained soils), and topographical features which may indicate the location of hazardous substance disposal (e.g., depressions that may indicate a historic excavation) should be provided. There should also be a discussion concerning possible problems, such as subsurface refusal]

[Include this paragraph first if exact sampling locations are to be determined in the field; otherwise delete.]

Exact soil sampling locations will be determined in the field based on accessibility, visible signs of potential contamination (e.g., stained soils), and topographical features which may indicate location of hazardous substance disposal (e.g., depressions that may indicate a historic excavation). Soil sample locations will be recorded in the field logbook as sampling is completed. A sketch of the sample location will be entered into the logbook and any physical reference points will be labeled. If possible, distances to the reference points will be given.

[If subsurface soil samples are to be analyzed for volatile compounds, use this paragraph; otherwise delete.]

Samples to be analyzed for volatile organic compounds will be collected first. Subsurface samples will be collected by boring to the desired sample depth using _____ _____ [whatever method is appropriate or available]. Once the desired sample depth is reached, soil samples for VOC analyses will be collected as independent, discrete samples. Surface soil samples will be collected using a 5 gram Encore sampling device, and will be collected in triplicate. Samples will be sealed using the Encore sampler and a zip lock bag or

else transferred directly from the sampler into a VOA vial containing either 10 mLs of methanol or sodium bisulfate solution. Sample containers will be closed as soon as they are filled, chilled immediately to 4°C before wrapping them in bubble wrap, and processed for shipment to the laboratory.

[If subsurface soil samples are being collected for other than volatile organic compounds, use these paragraphs; otherwise delete.]

Subsurface samples will be collected by boring to the desired sample depth using _____ [whatever method is appropriate or available]. Once the desired sample depth is reached, the _____ [hand- or power-operated device, such as a shovel, hand auger, trier, hollow-stem auger or split-spoon sampler] will be inserted into the hole and used to collect the sample. Samples will be transferred from the _____ [sampling device] to a sample-dedicated 1-gallon disposable pail and homogenized with a trowel.

Material in the pail will be transferred with a trowel from the pail to the appropriate sample containers. Sample containers will be filled to the top taking care to prevent soil from remaining in the lid threads prior to being sealed to prevent potential contaminant migration to or from the sample. After sample containers are filled, they will be immediately sealed, chilled if appropriate, and processed for shipment to the laboratory.

[Include this as the final paragraph regardless of the analyses for subsurface soil samples.]

Excess set-aside soil from the above the sampled interval will then be repacked into the hole.

_____

_____

_____

6.4 Sediment Sampling

[Use this subsection if sediment samples are to be collected. Specify the method (e.g., dredges) that will be used to collect the samples and at what depth samples will be collected. Describe how samples will be homogenized and the method to be used to transfer samples to the appropriate containers. If a SOP will be followed rather than the language provided, the SOP should be referenced and included in the appendix]

[If exact sediment sampling locations will be determined in the field, this should be stated. Describe where sediment samples will be collected, e.g., slow moving portions of streams, lake bottoms, washes, etc.]

Exact sediment sampling locations will be determined in the field, based on _____ [Describe the criteria to be used to determine sampling locations]. Care will be taken to obtain as representative a sample as possible. The sample will be taken from areas likely to collect sediment deposits, such as slow moving portions of streams or from the bottom of the lake at a minimum depth of 2 feet.

Sediment samples will be collected from the well bottom at a depth of _____ inches using a pre-cleaned _____ sampler.

[The final paragraph describes sample homogenization, especially important if the sample is to be separated into solid and liquid phases, and container filling. Include this paragraph, or a modified form of it, for all sediment sampling. It is assumed that sediment samples will not be analyzed for volatile compounds. If sediment is to be analyzed for volatile organic compounds, the samples to be analyzed for volatile compounds

should not be homogenized, but rather transferred directly from the sampler into the sample container. If feasible, an Encore sampling device should be used.]

Material in the sampler will be transferred to a sample-dedicated 1-gallon disposable pail and homogenized with a trowel. Material from the pail will be transferred with a trowel from the bucket to the appropriate sample containers. Sample containers will be filled to the top taking care to prevent soil from remaining in the lid groves prior to being sealed in order to prevent potential contamination migration to or from the sample containers. After sample containers are filled, they will be immediately sealed, chilled if appropriate, and processed for shipment to the laboratory.

_____

_____

_____

_____

6.5 Water Sampling

6.5.1 Surface Water Sampling

[Use this subsection if samples are to be collected in rivers, streams, lakes and reservoirs, or from standing water in runoff collection ponds, gullies, drainage ditches, etc. Describe the sampling procedure, including the type of sample (grab or composite - see definitions below), sample bottle preparation, and project-specific directions for taking the sample. State whether samples will be collected for chemical and/or microbiological analyses. Alternatively, reference the appropriate sections of attached SOPs.]

Grab: Samples will be collected at one time from one location. The sample should be taken from flowing, not stagnant water, and

the sampler should be facing upstream in the middle of the stream. Samples will be collected by hand or with a sample bottle holder. For samples taken at a single depth, the bottle should be uncapped and the cap protected from contamination. The bottle should be plunged into the water mouth down and filled 6 to 12" below the surface of the water. If it is important to take samples at depths, special samplers (e.g., Niskin or Kemmerer Depth Samplers) may be required. After filling the bottle(s), pour out some sample leaving a headspace of 2.5-5cm (1-2in). For microbiological samples, bottles and caps must be sterile. If sampling of chlorinated water is anticipated, sodium thiosulfate at a concentration of 0.1 mL of a 10% solution for each 125 mL (4 oz) of sample volume must be put into the bottle before it is sterilized.

Time Composite: Samples are collected over a period of time, usually 24 hours. If a composite sample is required, a flow- and time-proportional automatic sampler should be positioned to take samples at the appropriate location in a manner such that the sample can be held at 4°C for the duration of the sampling.

Spatial Composite: Samples are collected from different representative positions in the water body and combined in equal amounts. A Churn Splitter or equivalent device will be used to ensure that the sample is homogeneously mixed before the sample bottles are filled. Volatile organic compound samples will be collected as discrete samples and not composited.

[If exact surface water sample locations will be determined in the field, this should be stated. Describe the criteria that will be used to determine where surface water samples will be collected.]

_____

_____

_____

6.5.2 Groundwater Sampling

[This subsection contains procedures for water level measurements, well purging, and well sampling. Relevant procedures should be described under this heading with any necessary site-specific modifications. Alternatively, reference appropriate SOP(s).]

_____

_____

_____

6.5.2.1 Water-Level Measurements

[The following language may be used as is or modified to meet project needs.]

All field meters will be calibrated according to manufacturer's guidelines and specifications before and after every day of field use. Field meter probes will be decontaminated before and after use at each well.

If well heads are accessible, all wells will be sounded for depth to water from top of casing and total well depth prior to purging. An electronic sounder, accurate to the nearest +/- 0.01 feet, will be used to measure depth to water in each well. When using an electronic sounder, the probe is lowered down the casing to the top of the water column, the graduated markings on the probe wire or tape are used to measure the depth to water from the surveyed point on the rim of the well casing. Typically, the measuring device emits a constant tone when the probe is submerged in standing water and most electronic water level sounders have a visual indicator consisting of a small light bulb or diode that turns on when the probe encounters water. Total well depth will be sounded from the surveyed top of casing by lowering the weighted probe to the bottom of the well. The weighted probe will sink into silt, if present, at the bottom of the well screen. Total well depths will be measured by lowering

the weighted probe to the bottom of the well and recording the depth to the nearest 0.1 feet.

Water-level sounding equipment will be decontaminated before and after use in each well. Water levels will be measured in wells which have the least amount of known contamination first. Wells with known or suspected contamination will be measured last.

6.5.2.2 Purging

[Describe the method that will be used for well purging (e.g., dedicated well pump, bailer, hand pump). Reference the appropriate sections in the Ground Water SOP and state in which Appendix the SOP is located.]

[VERSION A]

All wells will be purged prior to sampling. If the well casing volume is known, a minimum of three casing volumes of water will be purged using the dedicated well pump.

[VERSION B]

All wells will be purged prior to sampling. If the well casing volume is known, a minimum of three casing volumes of water will be purged using a hand pump, submersible pump, or bailer, depending on the diameter and configuration of the well. When a submersible pump is used for purging, clean flexible Teflon tubes will be used for groundwater extraction. All tubes will be decontaminated before use in each well. Pumps will be placed 2 to 3 feet from the bottom of the well to permit reasonable draw down while preventing cascading conditions.

[VERSION C]

All wells will be purged prior to sampling. If the well casing volume is known, a minimum of three casing volumes of water will be purged using the dedicated well pump, if present, or a bailer, hand pump, or submersible pump depending on the diameter and

configuration of the well. When a submersible pump is used for purging, clean flexible Teflon tubes will be used for groundwater extraction. All tubes will be decontaminated before use in each well. Pumps will be placed 2 to 3 feet from the bottom of the well to permit reasonable draw down while preventing cascading conditions.

[ALL VERSIONS - to be included in all sample plans]

Water will be collected into a measured bucket to record the purge volume. Casing volumes will be calculated based on total well depth, standing water level, and casing diameter. One casing volume will be calculated as:

$$V = \pi d^2 h / 77.01$$

where:

V is the volume of one well casing of water ($1ft^3$ = 7.48 gallons);
d is the inner diameter of the well casing (in inches);
h is the total depth of water in the well (in feet).

It is most important to obtain a representative sample from the well. Stable water quality parameter (temperature, pH and specific conductance) measurements indicate representative sampling is obtainable. Water quality is considered stable if for three consecutive readings:

- temperature range is no more than $\pm 1^{\circ}C$;
- pH varies by no more than 0.2 pH units;
- specific conductance readings are within 10% of the average.

The water in which measurements were taken will not be used to fill sample bottles.

If the well casing volume is known, measurements will be taken before the start of purging, in the middle of purging, and at the end of purging each casing volume. If the well casing volume is

NOT known, measurements will be taken every 2.5 minutes after flow starts. If water quality parameters are not stable after 5 casing volumes or 30 minutes, purging will cease, which will be noted in the logbook, and ground water samples will be taken. The depth to water, water quality measurements and purge volumes will be entered in the logbook.

If a well dewaters during purging and three casing volumes are not purged, that well will be allowed to recharge up to 80% of the static water column and dewatered once more. After water levels have recharged to 80% of the static water column, groundwater samples will be collected.

_____

_____

_____

_____

6.5.2.3 Well Sampling

[Describe the method that will be used to collect samples from wells. (This will probably be the same method as was used to purge the wells.) Specify the sequence for sample collection (e.g., bottles for volatile analysis will be filled first, followed by semivolatiles, etc.). State whether samples for metals analysis will be filtered or unfiltered. Include the specific conditions, such as turbidity, that will require samples to be filtered. Alternatively, reference the appropriate sections in the Ground Water SOP and state in which Appendix the SOP is located.]

ALL VERSIONS - to be included in all sample plans]

At each sampling location, all bottles designated for a particular analysis (e.g., volatile organic compounds) will be filled sequentially before bottles designated for the next

analysis are filled (e.g., semivolatile organic compounds). If a duplicate sample is to be collected at this location, all bottles designated for a particular analysis for both sample designations will be filled sequentially before bottles for another analysis are filled. In the filling sequence for duplicate samples, bottles with the two different sample designations will alternate (e.g., volatile organic compounds designation GW-2, volatile organic compounds designation GW-4 (duplicate of GW-2), metals designation GW-2, metals designation GW-4 (duplicate of GW-2). Groundwater samples will be transferred from the tap directly into the appropriate sample containers with preservative, if required, chilled if appropriate, and processed for shipment to the laboratory. When transferring samples, care will be taken not to touch the tap to the sample container.

[If samples are to be collected for volatiles analysis, the following paragraph should be added; otherwise delete.]

Samples for volatile organic compound analyses will be collected using a low flow sampling device. A [Specify type of pump] pump will be used at a flow rate of _____. Vials for volatile organic compound analysis will be filled first to minimize the effect of aeration on the water sample. A test vial will be filled with sample, preserved with hydrochloric acid (HCl) and tested with pH paper to determine the amount of preservative needed to lower the pH to less than 2. The appropriate amount of HCl will then be added to the sample vials prior to the addition of the sample. The vials will be filled directly from the tap and capped. The vial will be inverted and checked for air bubbles to ensure zero headspace. If a bubble appears, the vial will be discarded and a new sample will be collected.

[If some samples for metals (or other) analysis are to be filtered, depending upon sample turbidity, the following paragraph should be added; otherwise delete.]

After well purging and prior to collecting groundwater samples for metals analyses, the turbidity of the groundwater extracted from each well will be measured using a portable turbidity meter.

A small quantity of groundwater will be collected from the well using the tap and a small amount of water will be transferred to a disposable vial and a turbidity measurement will be taken. The results of the turbidity measurement will be recorded in the field logbook. The water used to measure turbidity will be discarded after use. If the turbidity of the groundwater from a well is above 5 Nephelometric Turbidity Units (NTUs), both a filtered and unfiltered sample will be collected. A [specify size]-micron filter will be used to remove larger particles that have been entrained in the water sample. A sample-dedicated Teflon tube will be attached to the tap closest to the well head. The filter will be attached to the outlet of the Teflon tube. A clean, unused filter will be used for each filtered sample collected. Groundwater samples will be transferred from the filter directly into the appropriate sample containers with a preservative and processed for shipment to the laboratory. When transferring samples, care will be taken not to touch the filter to the sample container. After the filtered sample has been collected, the Teflon tube and filter will be removed and an unfiltered sample will be collected. A sample number appended with an "Fl" will represent a sample filtered with a 5-micron filter.

[If samples are to be filtered for metals (or other) analysis regardless of sample turbidity, the following paragraph should be added; otherwise delete.]

Samples designated for metals analysis will be filtered. A 5-micron filter will be used to remove larger particles that have been entrained in the water sample. A sample-dedicated Teflon tube will be attached to the tap closest to the well head. The filter will be attached to the outlet of the Teflon tube. A clean, unused filter will be used for each filtered sample collected. Groundwater samples will be transferred from the filter directly into the appropriate sample containers to which preservative has been added and processed for shipment to the laboratory. When transferring samples, care will be taken not to touch the filter to the sample container. After the filtered sample has been collected, the Teflon tube and filter will be

removed and an unfiltered sample will be collected. A sample number appended with an "Fl" will represent a sample filtered with a 5-micron filter.

_____

_____

_____

_____

6.6 Biological Sampling

For the purpose of this guidance, biological sampling falls into two categories. Other types of biological sampling events should be discussed with the QA Office to determine what type of planning document is needed. The two types addressed in this guidance are biological samples being collected for chemical analysis and biological samples for the purpose of assessing species diversity. If the latter type of sampling is planned, a quality assurance project plan may be a more appropriate document. Samples collected for microbiological analyses should be discussed under water sampling.

6.6.1 Biological Sampling for Chemical Analysis

[The two most common types of biological samples being collected for chemical analysis are fish and foliage samples. The following paragraphs are suggested, but field circumstances may dictate alternative collection procedures; if no biological samples will be collected, put "not applicable" by these sections. If a SOP will be followed, include it in the appendix.]

6.6.1.1 Fish Samples

[Use if collecting fish, otherwise delete. Alternatively, reference appropriate SOPs.]

Fish will be collected using _____ [name method; nets, electroshocking, lines, etc.]. Three fish of each type or species _____ [indicate type of fish, e. g., trout, catfish, etc.] will be collected. Efforts will be made to collect fish of approximately the same size and maturity by checking to make sure that lengths and weights do not differ by more than 20%. Once collected the _____ [indicate whether whole fish or filets] will be frozen, wrapped in aluminum foil and plastic bags and sent to a laboratory designated by the Region 9 QA Office.
[If samples are to be composited by the laboratory, also indicate that in this section.]

_____

_____

_____

6.6.1.2 Foliage Samples

[Use if collecting foliage samples, otherwise delete. Alternatively, reference and include appropriate SOPs. This section may require considerable modification because of the potential diversity of projects involving plants sampling.]

A representative foliage sample will be collected from the target area. It is recommended that a statistical approach be used, if possible. The following plants will be collected: _____, _____, and _____. These plants are being collected because they are were most likely affected by chemicals used in the area. Only foliage showing visible signs of stress or damage will be collected. Stems and twigs will be discarded; leaves only will be collected. The same type of leaf material [Describe material, mature leaves, young shoots, etc.] will be obtained from each plant type. Provided contamination is uniform, material will be composited from several plants to yield a total of about [specify quantity] pound(s) of material. Control

samples will also be collected from a nearby unaffected area [Describe area], if available. Latex gloves will be worn during the collection of all samples. Samples will be stored in [describe container, plastic bags, bottles, etc.] and brought to the laboratory as soon as possible to prevent sample deterioration.

6.6.2 Biological Sampling for Species Assessment

[Describe the collection of insects, other invertebrates, or other types of biological samples here. Reference or attach appropriate protocols to support the sampling effort]

_____

_____

_____

6.7 Decontamination Procedures

[Specify the decontamination procedures that will be followed if non-dedicated sampling equipment is used. Alternatively, reference the appropriate sections in the organization's Decontamination SOP and state in which Appendix the SOP is located.]

The decontamination procedures that will be followed are in accordance with approved procedures. Decontamination of sampling equipment must be conducted consistently as to assure the quality of samples collected. All equipment that comes into contact with potentially contaminated soil or water will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment. All sampling devices used, including trowels and augers, will be steam-cleaned or decontaminated according to EPA Region 9 recommended procedures.

The following, to be carried out in sequence, is an EPA Region IX recommended procedure for the decontamination of sampling equipment

[Use the following decontamination procedure if samples are collected for organic analyses only; otherwise delete.]

- Non-phosphate detergent and tap water wash, using a brush if necessary
- Tap-water rinse
- Deionized/distilled water rinse
- Pesticide-grade solvent (reagent grade hexane) rinse in a decontamination bucket
- Deionized/distilled water rinse (twice)

[Use the following decontamination procedures if samples are collected for inorganic (metals) analyses only, otherwise delete.]

- Non-phosphate detergent and tap water wash, using a brush if necessary
- Tap-water rinse
- 0.1 N nitric acid rinse
- Deionized/distilled water rinse (twice)

[Use the following decontamination procedures if samples are collected for both organic and inorganic analyses, otherwise delete.]

- Non-phosphate detergent and tap water wash, using a brush if necessary
- Tap-water rinse
- 0.1 N nitric acid rinse
- Deionized/distilled water rinse
- Pesticide-grade solvent (reagent grade hexane) rinse in a decontamination bucket
- Deionized/distilled water rinse (twice)

Equipment will be decontaminated in a predesignated area on pallets or plastic sheeting, and clean bulky equipment will be stored on plastic sheeting in uncontaminated areas. Cleaned small equipment will be stored in plastic bags. Materials to be stored more than a few hours will also be covered.

[NOTE: A different decontamination procedure may be used; but if so, a rationale for using the different approach should be provided.]

_____

_____

_____

_____

7.0 SAMPLE CONTAINERS, PRESERVATION AND STORAGE

[This section requires a reference to the types of bottles to be used, preparation and preservatives to be added. The organization responsible for adding preservatives should be named. If the information is provided in the request for analyses tables, reference them in the appropriate section below.]

The number of sample containers, volumes, and materials are listed in Section 5.0. The containers are pre-cleaned and will not be rinsed prior to sample collection. Preservatives, if required, will be added by _____ [name of agency/organization doing the sampling] to the containers prior to shipment of the samples to the laboratory.

7.1 Soil Samples

[If soil samples are to be collected, specify the analyses that will be performed. Use the language below or reference the

appropriate sections in the Preservation SOP and state in which Appendix the SOP is located.]

[Include this subsection if collecting soil samples; otherwise delete.]

[If requested analyses include analyses other than volatile organic compounds or metals, include this paragraph; otherwise delete.]

Soil samples for _____[Include all requested analysis(es), e.g., Pesticides, Semivolatile Organic Compounds] will be homogenized and transferred from the sample-dedicated homogenization pail into 8-ounce (oz), wide-mouth glass jars using a trowel. For each sample, one 8-oz wide-mouth glass jar will be collected for each laboratory. Alternatively, sample will be retained in the brass sleeve in which collected until sample preparation begins. The samples will be chilled to 4˚C immediately upon collection.

[If requested analyses include volatile organic compounds, include this paragraph; otherwise delete.]

VOLATILE ORGANIC COMPOUNDS. Soil samples to be analyzed for volatile organic compounds will be stored in their sealed Encore samplers for no more than two days prior to analysis. Frozen Encore sampler samples will be stored for no more than 4 days prior to analysis. If samples are preserved by ejecting into either methanol or sodium bisulfate solution the holding time is two weeks. Preserved samples will be chilled to 4˚C immediately upon collection.

[If requested analyses include metals, include this paragraph; otherwise delete.]

METALS. Surface soil samples to be analyzed for metals will be homogenized and transferred from the sample-dedicated homogenization pail into 8-oz, wide-mouth glass jars. For each sample, one 8-oz glass jar will be collected for each laboratory.

Samples will not be chilled. Subsurface samples will be retained in their original brass sleeves or other container unless transferred to bottles.

_____

_____

_____

_____

7.2 Sediment Samples

[If sediment samples are to be collected, specify the analyses that will be performed. Use the language below or reference the appropriate sections in a Preservation SOP and state in which Appendix the SOP is located.]

[If requested analyses include analyses other than volatile organic compounds or metals, include this paragraph; otherwise delete.]

_____[Include all requested analysis(es), e.g., Pesticides, Semivolatile Organic Compounds]. Sediment samples will be homogenized and transferred from the sample-dedicated homogenization pail into 8-oz wide-mouth glass jars. For each sample, one 8-oz glass jar will be collected for each laboratory. The samples will be chilled to 4˚C immediately upon collection.

[If requested analyses include volatile organic compounds, include this paragraph; otherwise delete.]

VOLATILE ORGANIC COMPOUNDS. Sediment samples to be analyzed for volatile organic compounds will be stored in their sealed Encore samplers for no more than two days prior to analysis. Frozen Encore sampler samples will be stored for no more than 4 days prior to analysis. If samples are preserved by ejecting into either methanol or sodium bisulfate solution the holding time is

two weeks. Preserved samples will be chilled to 4˚C immediately upon collection.

[If requested analyses include metals, include this paragraph; otherwise delete.]

METALS. Sediment samples, with rocks and debris removed, which are to be analyzed for metals will be homogenized and transferred from the sample-dedicated homogenization pail into 8-oz, wide-mouth glass jars. For each sample, one 8-oz glass jar will be collected for each laboratory. Samples will not be chilled.

_____

_____

_____

_____

7.3 Water Samples

[If water samples are to be collected, specify the analyses that will be performed. Use the language below or else reference the appropriate sections in a Preservation SOP and state in which Appendix the SOP is located.]

[Include this subsection if collecting water samples; otherwise delete.]

Depending on the type of analysis (organic or inorganic) requested, and any other project-specific analytical requirements, sample bottles should be plastic (inorganics) or glass (organics), pre-cleaned (general decontamination procedures) or low-detection level pre-cleaned (extensive decontamination procedures).

[Describe the type of bottles that will be used for the project, including the cleaning procedures that will be followed to prepare the bottles for sampling.]

[If requested analyses do not require preservation, include this paragraph; otherwise delete. A separate paragraph should be included for each bottle type.]

_____[Include all requested analysis(es), e.g., Anions, Pesticides, Semivolatile Organic Compounds]. Low concentration water samples to be analyzed for _____[Specify analysis(es), e.g., Semivolatile Organic Compounds] will be collected in _____ [Specify bottle type, e. g., 1-liter(L) amber glass bottles]. No preservative is required for these samples. The samples will be chilled to 4˚C immediately upon collection. Two bottles of each water sample are required for each laboratory.

[If requested analyses include volatile organic compounds, include this paragraph; otherwise delete.]

VOLATILE ORGANIC COMPOUNDS. Low concentration water samples to be analyzed for volatile organic compounds will be collected in 40-mL glass vials. 1:1 hydrochloric acid (HCl) will be added to the vial prior to sample collection. During purging, the pH will be measured using a pH meter to test at least one vial at each sample location to ensure sufficient acid is present to result in a pH of less than 2. The tested vial will be discarded. If the pH is greater than 2, additional HCl will be added to the sample vials. Another vial will be pH tested to ensure the pH is less than 2. The tested vial will be discarded. The vials will be filled so that there is no headspace. The samples will be chilled to 4˚C immediately upon collection. Three vials of each water sample are required for each laboratory.

[If requested analyses include metals, include this paragraph; otherwise delete.]

METALS. Water samples collected for metals analysis will be collected in 1L polyethylene bottles. The samples will be preserved by adding nitric acid (HNO_3) to the sample bottle. The bottle will be capped and lightly shaken to mix in the acid. A small quantity of sample will be poured into the bottle cap where the pH will be measured using pH paper. The pH must be $\leq$2. The sample in the cap will be discarded, and the pH of the sample will be adjusted further if necessary. The samples will be chilled to 4˚C immediately upon collection. One bottle of each water sample is required for each laboratory.

_____

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GENERAL CHEMISTRY (WATER QUALITY) PARAMETERS. Water samples collected for water quality analysis [Specify what parameters are included. Examples include (but are not limited to) anions (nitrate-N, nitrite-N, sulfate, phosphate), total phosphorus, ammonia-N, total dissolved solids, total suspended solids, alkalinity (may include carbonate, and/or bicarbonate), hardness, cyanide, MBAS (methylene blue active substances), etc.], will be collected in [Specify size of container] polyethylene bottles. The [Specify analysis] samples will be preserved by adding [Describe preservative appropriate to each sample type] to the sample bottle. The [Specify analysis] samples will not be preserved. If preservative is added, the bottle will be capped and lightly shaken to mix in the preservative. Where the preservative affects the pH, a small quantity of sample will be poured into the bottle cap where the pH will be measured using pH paper. The pH must be within the appropriate range. The sample in the cap will be discarded, and the pH of the sample will be adjusted further if necessary. Samples will be chilled to 4˚C immediately upon collection. Samples from each location that

require the same preservative will be placed in the same bottle if being analyzed by the same laboratory.

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7.4 Biological Samples

[If biological samples are to be collected, specify the analyses that will be performed. Use the language below or reference the appropriate sections in a Preservation SOP and state in which Appendix the SOP is located.]

_____

_____

_____

7.4.1 Fish Samples

Fish (whole or fillets) will be wrapped in aluminum foil, labeled, and placed in individual zip lock bags. The samples will be frozen as quickly as possible and shipped using dry ice to maintain the frozen state.

7.4.2 Foliage Samples

[Describe the containers that will be used for the project. Usually foliage samples are collected in clean zip lock bags, but bottles or other containers can be used. Paper bags are not recommended.]

For foliage samples, samples will be collected in one gallon zip lock. A self adhesive label will be placed on each bag and the top sealed with a custody seal.

7.4.3 Biological Sampling for Species Assessment

[Describe the containers in which macroinvertebrates, insects and other biological samples will be stored. If a fixation liquid will be used, it should be described as well. This section should also discuss any special handling procedures which must be followed to minimize damage to the specimens.]

_____

_____

_____

8.0 DISPOSAL OF RESIDUAL MATERIALS

[This section should describe the type(s) of investigation-derived wastes (IDW) that will be generated during this sampling event. EPA recognizes that IDW may not be generated in all sampling events, in which case this section would not apply. Use the language below or reference the appropriate sections in a Disposal of Residual Materials SOP and state in which Appendix the SOP is located. Depending upon site-specific conditions and applicable federal, state, and local regulations, other provisions for IDW disposal may be required. If any analyses of IDW are required, these should be discussed. If IDW are to be placed in drums, labeling for the drums should be discussed in this section.]

In the process of collecting environmental samples at the _____[site or sampling area name] during the site investigation (SI) [or name of other investigation], the _____[name of your organization/agency] sampling team will generate different types of potentially contaminated IDW that include the following:

- Used personal protective equipment (PPE)
- Disposable sampling equipment
- Decontamination fluids

[Include this bullet when sampling soils; otherwise delete.]

- Soil cuttings from soil borings

[Include this bullet when sampling groundwater; otherwise delete.]

- Purged groundwater and excess groundwater collected for sample container filling.

The EPA's National Contingency Plan (NCP) requires that management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. The sampling plan will follow the *Office of Emergency and Remedial Response (OERR) Directive 9345.3-02* (May 1991), which provides the guidance for the management of IDW. In addition, other legal and practical considerations that may affect the handling of IDW will be considered.

[Listed below are the procedures that should be followed for handling the IDW. The procedures have enough flexibility to allow the sampling team to use its professional judgment as to the proper method for the disposal of each type of IDW generated at each sampling location.]

[The following bullet is generally appropriate for site or sampling areas with low levels of contamination or for routine monitoring. If higher levels of contamination exist at the site or sampling area, other disposal methods (such as the drumming of wastes) should be used to dispose of used PPE and disposable sampling equipment.]

- Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal

landfill. Any PPE and disposable equipment that is to be disposed of which can still be reused will be rendered inoperable before disposal in the refuse dumpster.

[Include this bullet if sampling for both metals and organics; otherwise delete.]

- Decontamination fluids that will be generated in the sampling event will consist of dilute nitric acid, pesticide-grade solvent, deionized water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid will be sufficiently low to allow disposal at the site or sampling area. The water (and water with detergent) will be poured onto the ground or into a storm drain. Pesticide-grade solvents will be allowed to evaporate from the decontamination bucket. The nitric acid will be diluted and/or neutralized with sodium hydroxide and tested with pH paper before pouring onto the ground or into a storm drain.

[Include this bullet if sampling for metals but not organics; otherwise delete.]

- Decontamination fluids that will be generated in the sampling event will consist of nitric acid, deionized water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid will be sufficiently low to allow disposal at the site or sampling area. The water (and water with detergent) will be poured onto the ground or into a storm drain. The nitric acid will be diluted and/or neutralized with sodium hydroxide and tested with pH paper before pouring onto the ground or into a storm drain.

[Include this bullet if sampling for organics but not metals; otherwise delete.]

- Decontamination fluids that will be generated in the sampling event will consist of pesticide-grade solvent,

deionized water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid will be sufficiently low to allow disposal at the site or sampling area. The water (and water with detergent) will be poured onto the ground or into a storm drain. Pesticide-grade solvents will be allowed to evaporate from the decontamination bucket.

[Include this bullet if sampling soils; otherwise delete.]

- Soil cuttings generated during the subsurface sampling will be disposed of in an appropriate manner.

[Include this bullet if sampling groundwater; otherwise delete.]

- Purged groundwater will be _____

[Depending upon the degree of groundwater contamination, site-specific conditions, and applicable federal, state, and local regulations, disposal methods will vary. Disposal methods can also vary for purge water from different wells sampled during the same sampling event].

_____

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_____

_____

9.0 SAMPLE DOCUMENTATION AND SHIPMENT

9.1 Field Notes

This section should discuss record keeping in the field. This may be through a combination of logbooks, preprinted forms, photographs, or other documenttion. Information to be maintained is provided below.

9.1.1 Field Logbooks

[Describe how field logbooks will be used and maintained.]

Use field logbooks to document where, when, how, and from whom any vital project information was obtained. Logbook entries should be complete and accurate enough to permit reconstruction of field activities. Maintain a separate logbook for each sampling event or project. Logbooks should have consecutively numbered pages. All entries should be legible, written in black ink, and signed by the individual making the entries. Use factual, objective language.

At a minimum, the following information will be recorded during the collection of each sample:

[Edit this list as relevant.]

- Sample location and description
- Site or sampling area sketch showing sample location and measured distances
- Sampler's name(s)
- Date and time of sample collection
- Designation of sample as composite or grab
- Type of sample (soil, sediment or water)
- Type of sampling equipment used
- Field instrument readings and calibration
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.)
- Preliminary sample descriptions (e.g., for soils: clay loam, very wet; for water: clear water with strong ammonia-like odor)
- Sample preservation
- Lot numbers of the sample containers, sample identification numbers and any explanatory codes, and chain-of-custody form numbers
- Shipping arrangements (overnight air bill number)
- Name(s) of recipient laboratory(ies)

In addition to the sampling information, the following specific information will also be recorded in the field logbook for each day of sampling:

[Edit this list as relevant.]

- Team members and their responsibilities
- Time of arrival/entry on site and time of site departure
- Other personnel on site
- Summary of any meetings or discussions with tribal, contractor, or federal agency personnel
- Deviations from sampling plans, site safety plans, and QAPP procedures
- Changes in personnel and responsibilities with reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

[A checklist of the field notes, following the suggestions above, using only those that are appropriate, should be developed and included in project field notes.]

9.1.2 Photographs

[If photographs will be taken, the following language may be used as is or modified as appropriate.]

Photographs will be taken at the sampling locations and at other areas of interest on site or sampling area. They will serve to verify information entered in the field logbook. For each photograph taken, the following information will be written in the logbook or recorded in a separate field photography log:

- Time, date, location, and weather conditions
- Description of the subject photographed
- Name of person taking the photograph

9.2 Labeling

[The following paragraph provides a generic explanation and description of the use of labels. It may be incorporated as is, if appropriate, or modified to meet any project-specific conditions.]

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. A copy of the sample label is included in Appendix __. The samples will have preassigned, identifiable, and unique numbers. At a minimum, the sample labels will contain the following information: station location, date of collection, analytical parameter(s), and method of preservation. Every sample, including samples collected from a single location but going to separate laboratories, will be assigned a unique sample number.

9.3 Sample Chain-Of-Custody Forms and Custody Seals

[The following paragraphs provide a generic explanation and description of the use of chain-of-custody forms and custody seals. They may be incorporated as is, if they are appropriate, or modified to meet any project-specific conditions.]

[If Contract Laboratory Program Analytical Services (CLPAS) laboratories are to be used, include the following sentence; otherwise delete.]

Organic and inorganic chain-of-custody record/traffic report forms are used to document sample collection and shipment to laboratories for analysis.

[If Regional Analytical Program (RAP) laboratories are to be used (either the Regional laboratory in Richmond, CA, or other Region 9 scheduled commercial laboratories) include the following sentence; otherwise delete.]

Regional Analytical Program (RAP) chain-of-custody record forms are used to document sample collection and shipment to laboratories for analysis.

All sample shipments for analyses will be accompanied by a chain-of-custody record. A copy of the form is found in Appendix _. Form(s) will be completed and sent with the samples for each laboratory and each shipment (i.e., each day). Proper distribution of the forms is found in the "Instructions for Sample Shipping and Documentation" guidance document. If multiple coolers are sent to a single laboratory on a single day, form(s) will be completed and sent with the samples for each cooler.

The chain-of-custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the custody of the samples will be the responsibility of _____[name of agency/ organization conducting sampling]. The sampling team leader or designee will sign the chain-of-custody form in the "relinquished by" box and note date, time, and air bill number.

The sample numbers for all rinsate samples, reference samples, laboratory QC samples, and duplicates will be documented on this form (see Section 10.0). The original form will be sent to the Regional Sample Control Coordinator (RSCC) in the QA Office; a photocopy will be made for the _____[name of agency/ organization conducting sampling] master files. This form is not sent to the laboratory, but is sent to the QA Office when samples are shipped.

A self-adhesive custody seal will be placed across the lid of each sample. A copy of the seal is found in Appendix _. For VOC samples, the seal will be wrapped around the cap. The shipping containers in which samples are stored (usually a sturdy picnic cooler or ice chest) will be sealed with self-adhesive custody seals any time they are not in someone's possession or view before shipping. All custody seals will be signed and dated.

9.4 Packaging and Shipment

[The following paragraphs provide a generic explanation and description of how to pack and ship samples. They may be incorporated as is, if appropriate, or modified to meet any project-specific conditions.]

All sample containers will be placed in a strong-outside shipping container (a steel-belted cooler). The following outlines the packaging procedures that will be followed for low concentration samples.

1. When ice is used, pack it in zip-locked, double plastic bags. Seal the drain plug of the cooler with fiberglass tape to prevent melting ice from leaking out of the cooler.

2. The bottom of the cooler should be lined with bubble wrap to prevent breakage during shipment.

3. Check screw caps for tightness and, if not full, mark the sample volume level of liquid samples on the outside of the sample bottles with indelible ink.

4. Secure bottle/container tops with clear tape and custody seal all container tops.

5. Affix sample labels onto the containers with clear tape.

6. Wrap all glass sample containers in bubble wrap to prevent breakage.

7. Seal all sample containers in heavy duty plastic zip-lock bags. Write the sample numbers on the outside of the plastic bags with indelible ink.

8. Place samples in a sturdy cooler(s) lined with a large plastic trash bag. Enclose the appropriate COC(s) in a zip-lock plastic bag affixed to the underside of the cooler lid.

9. Fill empty space in the cooler with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment.

10. Ice used to cool samples will be double sealed in two zip lock plastic bags and placed on top and around the samples to chill them to the correct temperature.

11. Each ice chest will be securely taped shut with fiberglass strapping tape, and custody seals will be affixed to the front, right and back of each cooler.

The EPA Region 9 Regional Sample Control Center (RSCC: 415-744-1498) will be notified daily of the sample shipment schedule (Friday shipments must be reported no later than noon) and will be provided with the following information:

- Sampling contractor's name
- Name and location of the site or sampling area
- Case or Regional Analytical Program (RAP) number
- Total number(s) by concentration and matrix of samples shipped to each laboratory
- Carrier, air bill number(s), method of shipment (priority next day)
- Shipment date and when it should be received by lab
- Irregularities or anticipated problems associated with the samples
- Whether additional samples will be shipped or if this is the last shipment.

10.0 QUALITY CONTROL

This section should discuss the quality control samples that are being collected to support the sampling activity. This includes field QC samples, confirmation samples, background samples, laboratory QC samples, and split samples. Wherever possible, the locations at which the samples will be collected should be identified and a rationale provided for the choice of location. Frequency of collection should be discussed. All samples, except laboratory QC samples, should be sent to the laboratory blind,

wherever possible. Laboratory QC samples should be identified and additional sample (e.g., a double volume) collected for that purpose.

10.1 Field Quality Control Samples

Field quality control samples are intended to help evaluate conditions resulting from field activities and are intended to accomplish two primary goals, assessment of field contamination and assessment of sampling variability. The former looks for substances introduced in the field due to environmental or sampling equipment and is assessed using blanks of different types. The latter includes variability due to sampling technique and instrument performance as well as variability possibly caused by the heterogeneity of the matrix being sampled and is assessed using replicate sample collection. The following sections cover field QC.

10.1.1 Assessment of Field Contamination (Blanks)

Field contamination is usually assessed through the collection of different types of blanks. Equipment blanks are obtained by passing distilled or deionized water, as appropriate, over or through the decontaminated equipment used for sampling. They provide the best overall means of assessing contamination arising from the equipment, ambient conditions, sample containers, transit, and the laboratory. Field blanks are sample containers filled in the field. They help assess contamination from ambient conditions, sample containers, transit, and the laboratory. Trip blanks are prepared by the laboratory and shipped to and from the field. They help assess contamination from shipping and the laboratory and are for volatile organic compounds only. Region 9 recommends that equipment blanks be collected, where appropriate (e.g., where neither disposable or dedicated equipment is used). Field blanks are next in priority, and trip blanks next. Only one type of blank must be collected per event, not all three.

10.1.1.1 Equipment Blanks

In general, equipment (rinsate) blanks should be collected when reusable, non-disposable sampling equipment (e.g., trowels, hand augers, and non-dedicated groundwater sampling pumps) are being used for the sampling event. Only one blank sample per matrix per day should be collected. If equipment blanks are collected, field blanks and trip blanks are not required under normal circumstances. Equipment blanks can be collected for soil, sediment, and ground water samples. A minimum of one equipment blank is prepared each day for each matrix when equipment is decontaminated in the field. These blanks are submitted "blind" to the laboratory, packaged like other samples and each with its own unique identification number. Note that for samples which may contain VOCs, water for blanks should be purged prior to use to ensure that it is organic free. HPLC water which is often used for equipment and field blanks, can contain VOCs if it is not purged.

[If equipment blanks are to be collected describe how they are to be collected and the analyses that will be performed. A maximum of one blank sample per matrix per day should be collected, but at a rate to not exceed one blank per 10 samples. The 1:10 ratio overrides the one per day requirement. If equipment rinsate blanks are collected, field blanks and trip blanks are not required under normal circumstances. Use the language below or reference the appropriate sections in a Quality Control SOP and state in which Appendix the SOP is located.]

[Include this subsection if equipment blanks are to be collected, otherwise, delete.]

[Include this paragraph if blanks will be analyzed for both metals and organic compounds; otherwise delete.]

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring High Performance Liquid Chromatography (HPLC) organic-free (for organics) or deionized water (for inorganics) over the decontaminated sampling equipment. One equipment rinsate blank will be collected per matrix each day that sampling equipment is

decontaminated in the field. Equipment rinsate blanks will be obtained by passing water through or over the decontaminated sampling devices used that day. The rinsate blanks that are collected will be analyzed for _____
[Include names of target analytes, e.g., metals, total petroleum hydrocarbons, volatile organic compounds, etc.].

[Include this paragraph if blanks will be analyzed only for organic compounds; otherwise delete.]

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring High Performance Liquid Chromatography (HPLC) organic-free water over the decontaminated sampling equipment. One equipment rinsate blank will be collected per matrix each day that sampling equipment is decontaminated in the field. Equipment rinsate blanks will be obtained by passing water through or over the decontaminated sampling devices used that day. The rinsate blanks that are collected will be analyzed for _____
[Include names of target analytes, e.g., volatile organic compounds, total petroleum hydrocarbons, etc.]

[Include this paragraph if blanks will be analyzed only for metals; otherwise delete.]

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring deionized water over the decontaminated sampling equipment. One equipment rinsate blank will be collected per matrix each day that sampling equipment is decontaminated in the field. Equipment rinsate blanks will be obtained by passing deionized water through or over the decontaminated sampling devices used that day. The rinsate blanks that are collected will be analyzed for metals.

[Always include this paragraph.]

The equipment rinsate blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A

separate sample number and station number will be assigned to each sample, and it will be submitted blind to the laboratory.

10.1.1.2 Field Blanks

Field blanks are collected when sampling water or air and equipment decontamination is not necessary or sample collection equipment is not used (e.g., dedicated pumps). A minimum of one field blank is prepared each day sampling occurs in the field, but equipment is not decontaminated. These blanks are submitted "blind" to the laboratory, packaged like other samples and each with its own unique identification number. Note that for samples which may contain VOCs, water for blanks should be purged prior to use to ensure that it is organic free. HPLC water which is often used for equipment and field blanks, can contain VOCs if it is not purged.

[Include this subsection if field blanks will be collected; otherwise delete. Only one blank sample per matrix per day should be collected. If field blanks are prepared, equipment rinsate blanks and trip blanks are not required under normal circumstances.]

[Include this paragraph if blanks will be analyzed for both metals and organic compounds; otherwise delete.]

Field blanks will be collected to evaluate whether contaminants have been introduced into the samples during the sampling due to ambient conditions or from sample containers. Field blank samples will be obtained by pouring High Performance Liquid Chromatography (HPLC) organic-free water (for organics) and/or deionized water (for inorganics) into a sampling container at the sampling point. The field blanks that are collected will be analyzed for _____
[Include names of target analytes, e.g., metals, volatile organic compounds, etc.].

[Include this paragraph if blanks will be analyzed only for organic compounds; otherwise delete.]

Field blanks will be collected to evaluate whether contaminants have been introduced into the samples during the sampling due to ambient conditions or from sample containers. Field blank samples will be obtained by pouring High Performance Liquid Chromatography (HPLC) organic-free water into a sampling container at the sampling point. The field blanks that are collected will be analyzed for _____
[Include names of target analytes, e.g., volatile organic compounds, total petroleum hydrocarbons, etc.].

[Include this paragraph if blanks will be analyzed only for metals; otherwise delete.]

Field blanks will be collected to evaluate whether contaminants have been introduced into the samples during the sampling due to contamination from sample containers. Field blank samples will be obtained by pouring deionized water into a sampling container at the sampling point. The field blanks that are collected will be analyzed for metals.

[Always include this paragraph.]

The field blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A separate sample number and station number will be assigned to each sample, and it will be submitted blind to the laboratory.

10.1.1.3 Trip Blanks

Trip blanks are required only if no other type of blank will be collected for volatile organic compound analysis and when air and/or water samples are being collected. If trip blanks are required, one is submitted to the laboratory for analysis with every shipment of samples for VOC analysis. These blanks are submitted "blind" to the laboratory, packaged like other samples and each with its own unique identification number. Note that for samples which may contain VOCs, water for blanks should be purged prior to use to ensure that it is organic free.

Laboratory water which is used for trip blanks, can contain VOCs if it is not purged.

[Include this subsection if trip blanks will be collected; otherwise delete. Only one blank sample per matrix per day should be collected. Trip blanks are only relevant to volatile organic compound (VOC) sampling efforts.]

Trip blanks will be prepared to evaluate if the shipping and handling procedures are introducing contaminants into the samples, and if cross contamination in the form of VOC migration has occurred between the collected samples. A minimum of one trip blank will be submitted to the laboratory for analysis with every shipment of samples for VOC analysis. Trip blanks are 40-mL vials that have been filled with HPLC-grade water that has been purged so it is VOC free and shipped with the empty sampling containers to the site or sampling area prior to sampling. The sealed trip blanks are not opened in the field and are shipped to the laboratory in the same cooler with the samples collected for volatile analyses. The trip blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A separate sample number and station number will be assigned to each trip sample and it will be submitted blind to the laboratory.

10.1.1.4 Temperature Blanks

[Include this paragraph with all plans]

For each cooler that is shipped or transported to an analytical laboratory a 40 mL VOA vial will be included that is marked "temperature blank." This blank will be used by the sample custodian to check the temperature of samples upon receipt.

10.1.2 Assessment of Sample Variability (Field Duplicate or Co-located Samples)

Duplicate samples are collected simultaneously with a standard sample from the same source under identical conditions into

separate sample containers. Field duplicates will consist of a homogenized sample divided in two or else a co-located sample. Each duplicate portion should be assigned its own sample number so that it will be blind to the laboratory. A duplicate sample is treated independently of its counterpart in order to assess laboratory performance through comparison of the results. At least 10% of samples collected per event should be field duplicates. At least one duplicate should be collected for each sample matrix, but their collection can be stretched out over more than one day (e.g., if it takes more than one day to reach 10 samples). Every group of analytes for which a standard sample is analyzed will also be tested for in one or more duplicate samples. Duplicate samples should be collected from areas of known or suspected contamination. Since the objective is to assess variability due to sampling technique and possible sample heterogeneity, source variability is a good reason to collect co-located samples, not to avoid their collection.

[Include this paragraph if collecting soil samples; otherwise delete.]

Duplicate soils samples will be collected at sample locations _____

[Identify soil sample locations from which duplicate or collocated samples will be collected for duplicate analysis will be obtained].

Duplicate samples will be collected from these locations because _____

[Add sentence(s) here explaining a rationale for collecting duplicate samples from these locations; e.g., samples from these locations are suspected to exhibit moderate concentrations of contaminants or previous sampling events have detected moderate levels of contamination at the site or sampling area at these locations.]

[Include this paragraph if collecting soil samples and analyzing for compounds other than volatiles; otherwise delete.]

Soil samples to be analyzed for _____[List all analytical methods for this sample event except for volatiles] will be homogenized with a trowel in a sample-dedicated 1-gallon disposable pail. Homogenized material from the bucket will then be transferred to the appropriate wide-mouth glass jars for both the regular and duplicate samples. All jars designated for a particular analysis (e.g., semivolatile organic compounds) will be filled sequentially before jars designated for another analysis are filled (e.g., metals).

[Include this paragraph if collecting soil samples and analyzing for volatiles; otherwise delete.]

Soil samples for volatile organic compound analyses will not be homogenized. Equivalent Encore samples from a collocated location will be collected identically to the original samples, assigned unique sample numbers and sent blind to the laboratory.

[Include these paragraphs if collecting sediment samples. If volatile organic compound analysis will be performed on sediment samples, modify the above paragraph for soil sample volatile analyses by changing "soil" to "sediment".]

Duplicate sediment samples will be collected at sample locations _____.
[Identify sediment sample locations from which duplicate or collocated samples for duplicate analysis will be obtained].
Duplicate samples will be collected from these locations because _____.
[Add sentence(s) here explaining a rationale for collecting duplicate samples from these locations; e.g., samples from these locations are suspected to exhibit moderate concentrations of contaminants or previous sampling events have detected moderate levels of contamination at the site or sampling area at these locations.]

Sediment samples will be homogenized with a trowel in a sample-dedicated 1-gallon disposable pail. Homogenized material from the bucket will then be transferred to the appropriate

wide-mouth glass jars for both the regular and duplicate samples. All jars designated for a particular analysis (e.g., semivolatile organic compounds) will be filled sequentially before jars designated for another analysis are filled (e.g., metals).

[Include this paragraph if collecting water samples.]

Duplicate water samples will be collected for water sample numbers _____.
[Water sample numbers which will be split for duplicate analysis].
Duplicate samples will be collected from these locations because _____.
[Add sentence(s) here explaining a rationale for collecting duplicate samples from these locations; e.g. samples from these locations are suspected to exhibit moderate concentrations of contaminants or previous sampling events have detected moderate levels of contamination at the site or sampling area at these locations.] When collecting duplicate water samples, bottles with the two different sample identification numbers will alternate in the filling sequence (e.g., a typical filling sequence might be, VOCs designation GW-2, VOCs designation GW-4 (duplicate of GW-2); metals, designation GW-2, metals, designation GW-4, (duplicate of GW-2) etc.). Note that bottles for one type of analysis will be filled before bottles for the next analysis are filled. Volatiles will always be filled first.

[Always include this paragraph.]

Duplicate samples will be preserved, packaged, and sealed in the same manner as other samples of the same matrix. A separate sample number and station number will be assigned to each duplicate, and it will be submitted blind to the laboratory.

10.2 Background Samples

Background samples are collected in situations where the possibility exists that there are native or ambient levels of one or more target analytes present or where one aim of the sampling

event is to differentiate between on-site and off-site contributions to contamination. One or more locations are chosen which should be free of contamination from the site or sampling location itself, but have similar geology, hydrogeology, or other characteristics to the proposed sampling locations that may have been impacted by site activities. For example, an area adjacent to but removed from the site, upstream from the sampling points, or up gradient or cross gradient from the groundwater under the site. Not all sampling events require background samples.

[Specify the sample locations that have been designated as background. Include a rationale for collecting background samples from these locations and describe or reference the sampling and analytical procedures which will be followed to collect these samples.]

_____

_____

_____

10.3 Field Screening, Confirmation, and Split Samples

For projects where field screening methods are used (typically defined as testing using field test kits, immunoassay kits, or soil gas measurements, or equivalent, but not usually defined as the use of a mobile laboratory which generates data equivalent to a fixed laboratory), two aspects of the tests should be described. First, the QC which will be run in conjunction with the field screening method itself, and, second, any fixed laboratory confirmation tests which will be conducted. QC acceptance criteria for these tests should be defined in these sections rather than in the DQO section.

10.3.1 Field Screening Samples

[For projects where field screening methods are used describe the QC samples which will be run in the field to ensure that the screening method is working properly. This usually consists of a combination of field duplicates and background (clean) samples). The discussion should specify acceptance criteria and corrective action to be taken if results are not within defined limits. Discuss confirmation tests below.]

_____

_____

_____

10.3.2 Confirmation Samples

If the planned sampling event includes a combination of field screening and fixed laboratory confirmation, this section should describe the frequency with which the confirmation samples will be collected and the criteria which will be used to select confirmation locations. These will both be dependent on the use of the data in decision making. It is recommended that the selection process be at a minimum of 10% and that a selection criteria include checks for both false positives (i.e., the field detections are invalid or the concentrations are not accurate) and false negatives (i.e., the analyte was not detected in the field). Because many field screening techniques are less sensitive than laboratory methods false negative screening is especially important unless the field method is below the action level for any decision making. It is recommended that some "hits" be chosen and that other locations be chosen randomly.

[Describe confirmation sampling. Discuss the frequency with which samples will be confirmed and how location will be chosen. Define acceptance criteria for the confirmation results (e.g., RPD≤25%) and corrective actions to be taken if samples are not confirmed.]

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_____

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10.3.3 Split Samples

Split Samples are defined differently by different organizations, but for the purpose of this guidance, Region 9's QA Office considers split samples as ones that are divided among two or more laboratory for the purpose of providing an inter-laboratory or inter-organization comparison. Usually one organization (for example, a responsible party) collects the samples and provides sufficient material to the other organization (for example, EPA) to enable it to perform independent analyses. It is expected that the sampling party will have prepared a sampling plan which the QA Office has reviewed and approved that describes the sampling locations and a rationale for their choice, sampling methods, and analyses.

[Describe the purpose of the split sampling. Include references to the approved sampling plan of the party collecting the samples. Provide a rationale for the sample locations at which split samples will be obtained and how these locations are representative of the sampling event as a whole. Describe how results are to be compared and define criteria by which agreement will be measured. Discuss corrective action to be taken if results are found to not be in agreement.]

_____

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_____

10.4 Laboratory Quality Control Samples

Laboratory quality control (QC) samples are analyzed as part of standard laboratory practice. The laboratory monitors the precision and accuracy of the results of its analytical

procedures through analysis of QC samples. In part, laboratory QC samples consist of matrix spike/matrix spike duplicate samples for organic analyses, and matrix spike and duplicate samples for inorganic analyses. The term "matrix" refers to use of the actual media collected in the field (e.g., routine soil and water samples).

Laboratory QC samples are an aliquot (subset) of the field sample. They are not a separate sample, but a special designation of an existing sample.

[Include the following language if soil samples are to be collected for other than VOCs. Otherwise delete.]

A routinely collected soil sample (a full 8-oz sample jar or two 120-mL sample vials) contains sufficient volume for both routine sample analysis and additional laboratory QC analyses. Therefore, a separate soil sample for laboratory QC purposes will not be collected.

[Include the following language if soil samples are to be collected for other than VOCs. Otherwise delete.]

Soil samples for volatile organic compound analyses for laboratory QC purposes will be obtained by collecting double the number of equivalent Encore samples from a collocated location in the same way as the original samples, assigned a unique sample numbers and sent blind to the laboratory.

[Include the following language if water samples are to be collected. Otherwise delete.]

For water samples, double volumes of samples are supplied to the laboratory for its use for QC purposes. Two sets of water sample containers are filled and all containers are labeled with a single sample number.
For VOC samples this would result in 6 vials being collected instead of 3, for pesticides and semivolatile samples this would be 4 liters instead of 2, etc.]

The laboratory should be alerted as to which sample is to be used for QC analysis by a notation on the sample container label and the chain-of-custody record or packing list.

At a minimum, one laboratory QC sample is required per 14 days or one per 20 samples (including blanks and duplicates), whichever is greater. If the sample event lasts longer than 14 days or involves collection of more than 20 samples per matrix, additional QC samples will be designated.

For this sampling event, samples collected at the following locations will be the designated laboratory QC samples:

[If a matrix is not being sampled, delete the reference to that matrix.]

- For soil, samples _____
[List soil sample locations and numbers designated for QA/QC]
- For sediment, samples _____,
[List sediment sample locations and numbers designated for QA/QC]
- For water, samples _____.
[List water sample locations and numbers designated for QA/QC]

[Add a paragraph explaining why these sample locations were chosen for QA/QC samples. QA/QC samples should be samples expected to contain moderate levels of contamination. A rationale should justify the selection of QA/QC samples based on previously-detected contamination at the site or sampling area, historic site or sampling area operations, expected contaminant deposition/migration, etc.]

_____

_____

_____

_____

11.0 FIELD VARIANCES

[It is not uncommon to find that, on the actual sampling date, conditions are different from expectations such that changes must be made to the SAP once the samplers are in the field. The following paragraph provides a means for documenting those deviations, or variances. Adopt the paragraph as is, or modify it to project-specific conditions.]

As conditions in the field may vary, it may become necessary to implement minor modifications to sampling as presented in this plan. When appropriate, the QA Office will be notified and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the sampling project report.

12.0 FIELD HEALTH AND SAFETY PROCEDURES

[Describe any agency-, program- or project-specific health and safety procedures that 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 the organization health and safety plan may be included in the Appendix and referenced in this section.]

Table 5-1

REQUEST FOR ANALYTICAL SERVICES

MATRIX = SOIL

ANALYSES REQUESTED							ORGANIC				INORGANIC	
SPECIFIC ANALYSES REQUESTED							VOCs	SVOCs	Pesticides/ PCBs		Metals	
PRESERVATIVES							Chill to 4°C	Chill to 4°C	Chill to 4°C		None required	
ANALYTICAL HOLDING TIME(S)							Hold <2 days <4 days frozen	Hold <14 days prior to extraction, 40 days after extraction	Hold <14 days prior to extraction, 40 days after extraction		Hold <180 days (28 days for Hg)	
CONTRACT HOLDING TIMES(S)							Hold <2 days <4 days frozen	Hold <10 days prior to extraction, 40 days after extraction	Hold <10 days prior to extraction, 40 days after extraction		Hold to 35 days (26 days for Hg)	
NUMBER OF SAMPLES x NUMBER OF SAMPLE CONTAINERS							No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis		No. of Containers per Analysis	No. of Containers per Analysis
Sample Number	Sample Location	Sample Depth	Sampling Date	Special Designation	Conc. Low/Med		2 x Encore Samplers	1 x 8 ounce wide mouth glass jar	1 x 8 ounce wide mouth glass jar		1 x 8 ounce wide mouth glass jar	
TOTAL												

Table 5-2
REQUEST FOR ANALYTICAL SERVICES
MATRIX = SEDIMENT

ANALYSES REQUESTED							ORGANIC				INORGANIC	
SPECIFIC ANALYSES REQUESTED							VOCs	SVOCs	Pesticides/PCBs		Metals	
PRESERVATIVES							Chill to 4°C	Chill to 4°C	Chill to 4°C		None required	
ANALYTICAL HOLDING TIME(S)							Hold <2 days <4 days frozen	Hold <14 days prior to extraction, 40 days after extraction	Hold <14 days prior to extraction, 40 days after extraction		CLPAS Metals	
CONTRACT HOLDING TIMES(S)							Hold <2 days <4 days frozen	Hold <10 days prior to extraction, 40 days after extraction	Hold <10 days prior to extraction, 40 days after extraction		Hold to 35 days (26 days for Hg)	
NUMBER OF SAMPLES x NUMBER OF SAMPLE CONTAINERS							No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis		No. of Containers per Analysis	No. of Containers per Analysis
Sample Number	Sample Location	Sample Depth	Sampling Date	Special Designation	Conc. LOW/MED		2 x Encore Samplers	1 x 8 ounce wide mouth glass jar	1 x 8 ounce wide mouth glass jar		1 x 8 ounce wide mouth glass jar	
TOTAL												

Table 5-3
REQUEST FOR ANALYTICAL SERVICES
MATRIX = GROUNDWATER

ANALYSES REQUESTED							CONTRACT LABORATORY PROGRAM ANALYTICAL SERVICES (CLPAS)				REGIONAL ANALYTICAL PROGRAM (RAP)	
CHEMISTRY TYPE							INORGANICS	ORGANICS			ORGANICS	
SPECIFIC ANALYSES REQUESTED							Metals	VOCs	SVOCs	Pesticides/PCBs		
PRESERVATIVES							Add HNO3 to pH<2	Add 1:1 HCl to pH <2 Chill to 4°C	Chill to 4°C	Chill to 4°C		
ANALYTICAL HOLDING TIME(S)							Hold to 6 months (28 days for Hg)	Hold <7 days	Hold <7 days prior to extraction, 40 days after extraction	Hold <7 days prior to extraction, 40 days after extraction		
CONTRACT HOLDING TIMES(S)							Hold to 35 days (26 days for Hg)	Hold <5 days	Hold <5 days prior to extraction, 40 days after extraction	Hold <5 days prior to extraction, 40 days after extraction		
NUMBER OF SAMPLES x NUMBER OF SAMPLE CONTAINERS							No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis
Sample Number	Sample Location	Sample Depth	Sampling Date	Special Designation	Conc. LOW	MED	1 x 1 liter polyethylene bottle	3 x 40 ml glass vials	2 x 1 liter amber glass jar	2 x 1 liter amber glass jar		
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
TOTAL												

Table 5-4

REQUEST FOR ANALYTICAL SERVICES
MATRIX = SURFACE WATER

ANALYSES REQUESTED					CONTRACT LABORATORY PROGRAM ANALYTICAL SERVICES (CLPAS)				REGIONAL ANALYTICAL PROGRAM (RAP)	
CHEMISTRY TYPE					INORGANICS	ORGANICS			ORGANICS	
SPECIFIC ANALYSES REQUESTED					Metals	VOCs	SVOCs	Pesticides/PCBs		
PRESERVATIVES					Add HNO3 to pH<2	Add 1:1 HC1 to pH <2 Chill to 4°C	Chill to 4°C	Chill to 4°C		
ANALYTICAL HOLDING TIME(S)					Hold to 6 months (28 days for Hg)	Hold <7 days	Hold <7 days prior to extraction, 40 days after extraction	Hold <7 days prior to extraction, 40 days after extraction		
CONTRACT HOLDING TIMES(S)					Hold to 35 days (26 days for Hg)	Hold <5 days	Hold <5 days prior to extraction, 40 days after extraction	Hold <5 days prior to extraction, 40 days after extraction		
NUMBER OF SAMPLES x NUMBER OF SAMPLE CONTAINERS					No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis
Sample Number	Sample Location	Sample Depth	Sampling Date	Special Designation	Conc. LOW	MED	1 x 1 liter polyethylene bottle	3 x 40 mi glass vials	2 x 1 liter amber glass jar	2 x 1 liter amber glass jar		
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
					X							
Total					0	0	0	0	0	0	0	0

Table 5-5
REQUEST FOR ANALYTICAL SERVICES
MATRIX = FISH

ANALYSES REQUESTED					REGIONAL ANALYTICAL PROGRAM (RAP)				
CHEMISTRY TYPE					INORGANICS	ORGANICS			
SPECIFIC ANALYSES REQUESTED					RAP Metals	RAP SVOCs	RAP Pesticides/PCBs		
PRESERVATIVES					Freeze to <0°C	Freeze to <0°C	Freeze to <0°C		
ANALYTICAL HOLDING TIME(S)					Hold to 6 months (28 days for Hg)	Hold 1 year prior to extraction, 40 days after extraction	Hold 1 year prior to extraction, 40 days after extraction		
CONTRACT HOLDING TIMES(S)					Not applicable	Not applicable	Not applicable		
NUMBER OF SAMPLES x NUMBER OF SAMPLE CONTAINERS					No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis		
Sample Number	Sample Location	Sample Depth	Sampling Date	Special Designation	Conc. LOW	MED	1 x 8 ounce foil wrapped filet	1 x 8 ounce foil wrapped filet	1 x 8 ounce foil wrapped filet
					X				
					X				
					X				
					X				
					X				
					X				
					X				
					X				
					X				
					X				
					X				
					X				
					X				
					X				
					X				
Totals					0	0	0	0	0

If fish are to be composited, provide 3 x 8 oz. filets, 8 oz. from each fish. If whole fish are sent, adjust table accordingly.