New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB)

Standard Operating Procedure (SOP) for

# FIELD SAMPLING PLAN DEVELOPMENT AND EXECUTION

Approval Signatures

Kristopher Barrios
Subject Matter Expert

1/17/2019
Date

Miguel Montoya
Quality Assurance Officer

01/17/19
Date

Kristopher Barrios
Program Manager - Monitoring, Assessment and Standards Section

1/17/2019
Date

## 1.0 Purpose and Scope

The purpose of this procedure is to describe the process for preparing and implementing a Field Sampling Plan (FSP). The FSP serves as the comprehensive record for each individual project. The FSP incorporates and documents the results of the *Planning Process for Environmental Data Collection Activities (the Planning Process)* (NMED/SWQB 2018a). The *Planning Process* provides sufficient specific information so that the planned environmental data collection activities can be effectively implemented, and documents all relevant activities and issues that arise throughout the course of the project.

## 2.0 Responsibilities

The Project Manager(s), at the direction of the Program Manager, is responsible for preparing the FSP; however specific tasks relating to the development of the FSP may be assigned to other project team members as appropriate. Please refer to section 6.0 of this SOP for additional information pertaining to project team responsibilities. The Program Manager and Quality Assurance Officer (QAO) review the document for approval before sampling begins. The Program Manager review is for conformance to EPA grant requirements, technical accuracy and resource availability; the QAO review is for conformance with the SWQB's Quality Management Plan (NMED/SWQB. 2018a), Quality Assurance Project Plan for Water Quality Management Programs (NMED/SWQB. 2018b), and FSP requirements according to this Standard Operating Procedure (SOP). The FSP becomes final after approval by the Program Manager and QAO. A copy of the approved FSP is maintained by the Project Manager(s) through the completion of the project. The QAO will maintain the original approved FSP in accordance with 1.21.2 NMAC, Retention and Disposition of Public Records.

## 3.0 Background and Precautions

The Sampling Design section of the "Bureau's QAPP" (NMED/SWQB. 2018b), states water quality monitoring activities which require a FSP or SAP. The FSP plan will consist of two components. The first component is comprised of the narrative portions which are compiled into one text document. The second component is a series of tables that document the project description, sampling plan and resource requirements for the project. The tables provide information detailing the project location, chemical, physical, and biological sampling to be performed at each sampling location, and calculate the resources needed to conduct the planned sampling and complete the FSP. Templates for these documents are included as attachments to this SOP and are available on the SWQB SOP webpage (https:/www.env.nm.gov/surface-water-quality/sop/). For environmental monitoring as described in the Bureau's QAPP, conformance to the Bureau's QAPP and adherence to SWQB SOPs is sufficient to assure the quality of the data.

A project-specific FSP and a project specific QAPP are required for environmental data collection activities that are not identified in the Bureau QAPP. A project-specific FSP describes the sampling plan and a QAPP assures the quality of the data. The FSP and QAPP may be combined into one document (i.e., Sampling and Analysis Plan), if the QAPP includes details about sampling type, locations, frequency and resources needed to conduct planned environmental data collection activities

and meets all requirements of EPA QA/R5 (USEPA. 2001). The major difference between the QAPP and the FSP will be that the FSP includes information about resource requirements. In any case, the resources required for the environmental data collection activities described by either the QAPP or the FSP should conform to those available and described in the grant workplan or other documentation.

## 4.0 Definitions

Field Sampling Plan (FSP) ─ A document that provides guidance for all fieldwork by defining in detail the sampling and field data-gathering methods as well as resource requirements for the project.

Program Manager ─ An individual within the SWQB that manages a program such as the Monitoring, Assessment and Standards Section (MASS), Watershed Protection Section (WPS) or Point Source Regulation Section (PSRS). The Program Manager may be the same individual as the Subject Matter Expert.

Project Manager ─ An individual responsible for a specific project. This individual, in most cases, holds a different title within the organization. The Program Manager and Project Manager are not necessarily synonymous. The Project Manager may be the same individual as the Subject Matter Expert.

Project Team ─ A group of individuals taking part in the planning process of the FSP or SAP and implementing the plan as defined in the FSP or SAP.

Quality Assurance (QA) ─ An integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the SWQB.

Quality Control (QC) ─ The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the SWQB; operational techniques and activities that are used to fulfill requirements for quality.

Quality Assurance Officer (QAO) ─ An individual within the MASS that is responsible for overseeing the development and implementation of all quality assurance procedures and processes within the SWQB including those projects that receive support or funding from the SWQB. The QAO is also responsible for validating and verifying data sets for potential use in assessment of surface waters.

Quality Assurance Project Plan (QAPP) ─ A formal planning document for environmental data collection activities that describes the data collection procedures and the quality assurance and quality control activities that must be implemented to ensure that the results are sufficient and adequate to satisfy the stated performance criteria.

Quality Management Plan (QMP) ─ Establishes the principles, requirements, and practices necessary to implement the quality system for the SWQB's environmental data operations.

Sampling and Analysis Plan (SAP) ─ A document that details the procedural and analytical requirements for a one-time or time-limited project. A SAP contains all the elements of a QAPP and a FSP that must be provided to meet the requirements for any project funded by the EPA under which environmental measurements are to be taken.

Standard Operating Procedure (SOP) ─ A document that lists the steps that should be completed when performing a task.

Subject Matter Expert (SME) ─ A person who is familiar with the purpose and procedure for accomplishing a task. The SME may hold another title within the organization.

Surface Water Quality Information Database (SQUID) ─ The SWQB database for storing, retrieving and reporting laboratory results, field observations, biologic assemblage data, LTD data, and stream habitat/geomorphic data.

## 5.0 Equipment and Tools

Access to SQUID, ArcMap (or equivalent), SWQB Mapper, and Microsoft Office (or equivalent).

## 6.0 Process Description

Technical personnel complete the *Planning Process for Environmental Data Collection Activities* (the *Planning Process*) and prepare a FSP. The *Planning Process* and the FSP development process and requirements are described in section 6.1 of this SOP.

### 6.1 Planning Process for Environmental Data Collection Activities

The *Planning Process* leading up to development of an FSP is as follows:

The Program Manager through the *Planning Process*,

- Assigns a person or persons to be Project Manager(s) who are responsible for preparing FSP.
- Assembles the Project Team with the coordination of the Project Manager(s). Besides the Project Manager(s), the project team may include appropriate technical staff members from within the SWQB, and contractors or their representatives if any of the environmental data collection activities will be contracted.
- Establishes preliminary project goals and may list preliminary questions, monitoring strategy or decisions to be resolved by the project. Ensures that the Project Manager(s) have a copy of the relevant workplan, and provides an estimate of the available resources (general funds or WTUs) and of the anticipated schedule.

The Project Manager(s) through the *Planning Process*,

- Develops and presents anticipated schedule and estimates resources requirements to the Project Team.

- Leads internal planning meetings to gather input from Project Team to begin *Planning Process.*

The Project Manager(s) meet with the Project Team and gather or make assignments to gather data from internal or external sources needed in the *Planning Process.*

The Project Team (with coordination from the Project Manager(s) and Program Manager), through the *Planning Process*,

- Specifies and prioritizes the questions that the project will be designed to answer and the decisions that can be made as a result of the project.
- Details the type and quantity of data needed to ensure that the planned data collection activities will provide data that are sufficient to answer the questions.
- Identifies how the data will be used to support the project objectives.
- Ensures the objectives and decisions criteria listed in Bureau's QAPP are consistent with the objectives of project.

Following identification of the project's goals and objectives, the Project Team (with coordination from the Project Manager(s) and Program Manager), begins development of the FSP. The table below provides information pertaining to task and responsible party associated with the development of FSP.

| **Responsible Party** | **Task** |
|---|---|
| Program Manager | • Reviews the FSP for conformance to grant workplan requirements, technical accuracy and resource availability.<br>• Provides Project Manager(s) and Project Team with an estimate of the available resources (general funds or WTUs) and of the anticipated schedule. |
| QAO | • Reviews the FSP for conformance with QMP (NMED/SWQB. 2018a), QAPP (NMED/SWQB. 2018b) and FSP SOP requirements. |

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| Project Manager(s) | • Maintains the project files and coordinates the development of the FSP through the *Planning Process* and the FSP development.<br>• Ensures the progress of the *Planning Process* is kept on track and complies with the requirements set forth in the Bureau's QMP and QAPP<br>• Schedules planning meetings with other technical staff and stakeholders (e.g., Tribes, USFS, BLM, State Parks, NMDGF, LANL, NWR, etc.) as requested or needed during the *Planning Process*.<br>If the project encompasses Pueblo or Tribal lands a formal letter from the Cabinet Secretary or other senior management, but prepared by the Project Manager(s), should be sent to the Tribal Governor informing them of the project and seeking their input in the Planning Process<br>• Estimates the anticipated schedule and resource requirements.<br>Provide list of needed supplies (e.g., sampling containers, calibration standards, tubing, filters, acids, and any other expendable supplies) to Program Manager.<br>• Plans, schedules, and conducts a pre-project public meeting in the project area according to the requirement of the WQMP/CPP.<br>The project team with the leadership of the Project Manager presents the draft FSP to provide information on why the project is being conducted, detail the project data collection efforts, and encourage discussion from the public on all aspects of the project. Project Manager(s) will address all public input received and may modify the FSP as needed.<br>• Prepares and provides final FSP to Program Manager and QAO for approval |
| Project Team | • Produces a list of AUs that possibly require standards revision, if applicable.<br>• Considers possible options for collecting the data (i.e., what type and quantity of data are needed to most effectively answer the project questions). Documents data collection strategy (frequency and schedule of the data collection events) and the sampling rationale.<br>• Collates information for Project Manager(s) and Program Manager for the preparation and generation of the FSP. Reviews and reports any discrepancies of FSP to Project Manager(s). |

## 6.2 Field Sampling Plan Elements

The FSP incorporates and documents the results of the *Planning Process* and provides sufficient specific information so that the planned environmental data collection activities can be effectively implemented.

The preparation of the FSP begins during the *Planning Process* of each project. The FSP consists of two components, the narrative portions which are compiled into one text document and then a series of tables used to describe: 1) the overall sampling plan for the project, 2) a summary of the chemical, physical, and biological sampling and 3) an estimate of the analytical, travel, and other anticipated costs associated with the project. Templates are included as attachments to this SOP and are available on the SWQB's SOP webpage (https:/www.env.nm.gov/surface-water-quality/sop/).

FSPs will address the following elements (I-VII):

I. Introduction – Brief introduction to the project that describes the context of the project in relation to the overall goals and objectives stated in the Bureau's QAPP.

II. Responsible Parties and Organization for Executing FSP– Identifies all project personnel (i.e., Program Manager, QAO, Project Manager(s), Project Team) and describes their associated roles and responsibilities. See table below for an example of general roles and responsibilities of personnel participating in the FSP.

| Responsible Party | Task |
|---|---|
| Program Manager | • Directs staff to publish the FSP according to program and/or grant requirements.<br>• Manages project personnel and resources throughout the project in coordination with Project Manager(s).<br>• Provides oversight and coordinates with QAO and Project Manager(s) on any data collection activities conducted not in accordance with the FSP, QAPP, or current SOPs.<br>• Conduct environmental data collection activities in accordance with the developed FSP, QAPP, and current SWQB SOPs. |
| QAO | • Retains FSP in accordance with 1.21.2 NMAC, Retention and Disposition of Public Records.<br>• Conducts audits as needed to ensure compliance with FSP, QAPP and SOPs. |

| Responsible Party | Task |
|---|---|
| Project Manager(s) | • Manages project personnel and resources throughout the project with coordination from Program Manager.<br>• Conduct environmental data collection activities in accordance with the developed FSP, QAPP, and current SWQB SOPs. Any data collection activities conducted not in accordance with the FSP, QAPP, or current SOPs will be documented and reported to the Program Manager and QAO.<br>• Conducts mid-project meeting with team to discuss any changes to the project plan. Coordinates and conducts post-project meeting with team to discuss differences between planned and actual sampling and what data gaps, if any, exist.<br>• Writes, coordinates, and assembles report and/or other grant deliverables required of the project. |
| Project Team | • Conduct environmental data collection activities in accordance with the developed FSP, QAPP, and current SWQB SOPs. Any data collection activities conducted not in accordance with the FSP, QAPP, or current SOPs will be documented and reported to the Project Manager(s).<br>• Writes assigned sections of reports and/or other grant deliverables required throughout the project. |

III. Project Description – Provides background information including project goals and principle objectives, monitoring strategy, a schedule identifying general timelines for project tasks and milestones, and a project description that details the region encompassed by the project along with any additional information. This section should also include one or more sampling location maps, as required.

**This section should include the following tables (as applicable):**

A. Assessment Unit List – Includes information regarding the AUs included in the project including AU ID and name, water quality segment, current impairment(s), IR Category and current TMDL(s).

B. Stations Lists – Includes pertinent information for each sampling station in the project area. This may include the assessment unit (AU) name, station name, unique station identification number, and station rationale.

IV. Documentation – Describes how the environmental data collection activities and results of the project will be documented, including any deviations from the original plan and any issues that arise with any associated corrective actions.

V. Sampling Plan – Summarizes through a narrative and a series of tables the specific data collection efforts undertaken as part of the project. This section summarizes sites to be

sampled and the rationales for selecting those sites. The type of sampling and frequency are also documented including specifics on chemistry, datalogger deployment, and biology/habitat sampling. This includes QA sampling as required by the Bureau's QAPP, SOPs, or project-specific QAPP. The information below provides a step-by-step process for the development of the Sampling Plan section of the FSP.

**Step-by-Step Process for the Development of the Sampling Plan (conducted by project personnel)**

| | |
|---|---|
| State Type of Monitoring to be Conducted for Project | **SWQB Monitoring Types which Require a FSP:**<br>• Water Quality Ambient/Assessment Monitoring<br>• SWQB Watershed Protection Projects<br>• Effectiveness Monitoring<br>• Independent Studies Conducted by the SWQB (or on its behalf) |
| Select the Sampling Location Based on Type of Monitoring | **A narrative description provided by project personnel which justifies the selected sample location.**<br><br>For example:<br><br>• For the SWQB, stream segments are termed assessment units (AUs). For targeted monitoring, typically only one sampling station is located within each AU, generally at the downstream end; however, if there are questions regarding the homogeneity of an AU then multiple sampling locations may be warranted to identify potential transition point(s) and accurately characterize the AU(s)[1].<br>• For probabilistic monitoring, stream segment stations are randomly selected for monitoring. Project personnel reviews the probabilistic sites for correct resource type and accessibility.<br>• For fixed-station monitoring existing or historic stations should be reviewed to determine their relevance or to enable the examination of waterbody characteristics and temporal trends. For example, project personnel may choose not to select stations that are no longer at active discharges, are located within ephemeral waters, or that bracket minor point sources. In addition, if an active USGS gaging station is located in the reach, it should be considered for selection based on of the availability of flow and/or additional water quality data and accessibility. |

[1] There are several factors to evaluate when determining the homogeneity of the AU: Are there significant tributaries entering along the reach, changes in geology, dramatic shifts in land use, dramatic change in slope, changes in riparian vegetation type and amount, does the stream reach traverse across an ecoregion or sediment site class boundary, are there any point sources discharging into the reach or irrigation return flows discharging into the reach?

| | |
|---|---|
| | • For effectiveness monitoring, sample locations are selected to monitor and model changes in physical, chemical, and biological data associated with nonpoint source pollution control projects for the purpose of assessing the projects overall effectiveness in reducing nonpoint sources and improving water quality. |
| Conducts Field Reconnaissance to Locate Sampling Stations and Obtain Physical and Legal Access as Required | • Obtain latitude, longitude, and elevation based on GPS readings (or estimate from SWQB Mapper or other computer programs) for generating maps and creating sampling stations in SQUID. Confirm and update coordinates as necessary. Request Station IDs and enter new station information into SQUID prior to any sampling, if applicable. |
| Selects the Analytes for Sampling Location Based on Project Objectives | • The analytes of interest may vary but should account for historic or current impairments, suspected or confirmed sources of pollutants, or programmatic needs such as assessment, standards revision, effectiveness monitoring or protocol development. |
| Determines Timing and Frequency of Sampling Based on Project Objectives. | For example:<br>• The SWQB's MASS uses targeted monitoring, for chemical sampling which typically involves multiple sampling and on-site measurements of water quality variables over three-seasons to capture a variety of environmental conditions related to water quality. Depending on the objectives of the project, sampling may also target periods where exceedences are expected or where designated use attainment is critical, such as sampling for metals analysis during spring runoff or for primary contact use during May through September.<br>• Probabilistic monitoring involves a single visit to a monitoring station timed to meet biological and physical habitat index period requirements.<br>• Fixed-station monitoring typically involves multiple visits to existing or historic stations to capture a variety of environmental conditions related to water quality that can be used to determine the waterbody's water characteristics and temporal trends. Fixed-station monitoring may be done over a specified location for a particular period of time or be conducted on a rotating basin schedule. |

- Biological sampling is timed to coincide with critical periods for aquatic communities, such as seasonal low flow, and is typically conducted during the biological index period (August 15th – November 15th). During bio/hab planning, the Project Manager(s) should consult with staff regarding suitable macroinvertebrate reference sites for all biological stations not in ecoregions 21 or 23 (Southern Rockies or AZ/NM Mountains). Reference sites should be documented in the FSP and must be sampled during the same project year to reduce the influence of non-water quality environmental variables such as drought.
- Physical habitat sampling is timed to coincide with periods of reduced snowmelt runoff and lower chance of storm events, typically May-June and September-November.

**The Sampling Plan section of the FSP should include the following tables (as applicable):**

A. Chemistry Sampling Summary – Summarizes what parameters will be sampled, where they will be sampled, and how frequently they will be sampled, including QA sampling as required by the Bureau's QAPP, SOPs, or project-specific QAPP.
B. Datalogger/Biology/Habitat Sampling Summary – Summarizes where dataloggers will be deployed and biological and physical habitat data will be collected, including any QA sampling as required by the Bureau's QAPP, SOPs, or project-specific QAPP.

VI. Resource Requirements – Summarizes the resources necessary to complete the project through a narrative and a series of tables.

**This section should include the following tables (as applicable):**

A. Budget Estimates – Collates budget information from Chemistry Sampling and Datalogger/Biology/Habitat Sampling spreadsheets to provide estimates pertaining to analytical costs.
B. Travel Costs – Summarizes fuel and per diem costs, staff time estimates, and any other anticipated costs necessary to complete the planned sampling.

VII. Reporting – Provides detailed information stating type of report(s) and/or other grant deliverables required upon completion of the project.

### 6.3 Review and approval of the Field Sampling Plan

After the planning and preparation portions of the FSP are finalized, the Project Manager(s) submits the FSP to the Program Manager and QAO for review and approval. Once approved the QAO retains final FSP in accordance with 1.21.2 NMAC, Retention and Disposition of Public Records. The Project

Manager(s) will provide a copy of the approved FSP to all project personnel. Project personnel implement the plan as defined in the approved FSP. Project activities will be noted on the field forms and entered into SQUID to document progress throughout the course of the project. Once the sampling portion has been completed and all data have been verified and validated, the FSP provides the basis for the final project report.

## 7.0 Data and Records Management

The FSP serves as the comprehensive planning document for each individual project. The FSP incorporates and documents the planning process, provides sufficient specific information so that the planned environmental data collection activities can be effectively implemented, and documents all relevant activities and issues that arise throughout the course of the project. All documentation associated with this process are stored on the SWQB server (file depot) along with approved FSP or SAP. The original approved FSP is kept by QAO and stored in accordance with 1.21.2 NMAC, Retention and Disposition of Public Records.

## 8.0 Quality Assurance and Quality Control (QAQC)

QAQC is implemented through adherence to the process outlined in this SOP for Field Sampling Plan Development and Execution. Conducting QAQC activities reduces the variability and uncertainty in the decision-making process. Additionally, following procedures outlined in this SOP may identify areas where variability can be reduced or eliminated in future data collection efforts, thereby improving the overall quality of the project being implemented. If, at any time, the QAO determines this process is not being adhered to, the QAO has the authority to cease activities specific to this SOP with prior support and approval by the SWQB Bureau Chief or Program Manager, until such a time that the issue can be resolved.

## 9.0 Related Forms

FSP Table Template
FSP Template

## 10.0 Revision History

**Original (December 15, 2011).**

- **Revision 1. December 1, 2012.** Changed section name from *Monitoring and Assessment* (MAS) to *Monitoring, Assessment and Standards* (MASS) to reflect change in organizational structure; under *Execution of the FSP*, requested Level 1 and Level 2 sediment surveys to be conducted during same site visit; changed sampling timeframe of Level 1 nutrient screenings to allow time for stream to respond to warmer temperatures; required sonde deployment and chlorophyll-a data to be collected at all sites identified by preliminary nutrient assessment or previously listed for nutrients; clarified the “when/why” of benthic macroinvertebrate and fish data collections.
  Jodey Kougioulis, QAO; Shelly Lemon, SME/Program Manager

- **Revision 2. April 7, 2015.** Updated the name of the NMED SWQB water quality database from NMEDAS to SQUID; small editorial changes; and minor revisions/clarifications to staff responsibilities.
  Jodey Kougioulis, QAO; Scott Murray, SME, James Hogan, Program Manager

- **Revision 3. January 14, 2019.** Editorial changes; updates to depreciated procedures; removed procedures specified in other SOPs; removed specific planning information belonging within the FSP; and minor revisions/clarifications to staff responsibilities.
  Miguel Montoya, QAO; Kristopher Barrios, SME/Program Manager

## 11.0 References


New Mexico Environment Department / Surface Water Quality Bureau (NMED/SWQB). 2016. Surface Water Quality 10-Year Monitoring and Assessment Strategy. Santa Fe, NM. Available at: https://www.env.nm.gov/surface-water-quality/protocols-and-planning/

New Mexico Environment Department / Surface Water Quality Bureau (NMED/SWQB). 2018a. Quality Management Plan for Environmental Data Operations [QMP], *Planning Process for Environmental Data Collection Activities*. Santa Fe, NM. Available at: https://www.env.nm.gov/surface-water-quality/protocols-and-planning

New Mexico Environment Department / Surface Water Quality Bureau (NMED/SWQB). 2018b. Quality Assurance Project Plan for Water Quality Management Programs [QAPP]. Santa Fe, NM. Available at: https://www.env.nm.gov/surface-water-quality/protocols-and-planning

New Mexico Water Quality Control Commission. 2011. State of New Mexico Statewide Water Quality Management Plan and the Continuing Planning Process [WQMP]. Santa Fe, NM. Available at: https://www.env.nm.gov/surface-water-quality/protocols-and-planning

United States Environmental Protection Agency (USEPA). 2002. Consolidated Assessment and Listing Methodology (CALM): Towards a compendium of best practices. Office of Wetlands, Oceans, and Watersheds. Washington, D.C.

United States Environmental Protection Agency (USEPA). 2001. EPA Requirements for Quality Assurance Project Plans. EPA QA/R5. Office of Environmental Information. March, 2001. Washington, DC.

United States Environmental Protection Agency (USEPA). 2009. Information concerning 2010 Clean Water Act sections 303(d), 305(b), and 314 integrated reporting and listing decisions. Memorandum from the Office of Wetlands, Oceans, and Watersheds. May 5, 2009. Washington, D.C.