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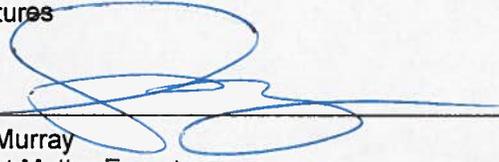
New Mexico Environment Department
Surface Water Quality Bureau

Standard Operating Procedure

for

FIELD SAMPLING PLAN DEVELOPMENT AND EXECUTION

Approval Signatures



Scott Murray
Subject Matter Expert

4-20-15

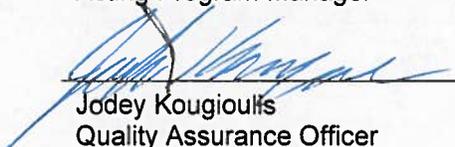
Date



James Hogan
Acting Program Manager

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Jodey Kougioulis
Quality Assurance Officer

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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 2011a), 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 Coordinator(s), at the direction of the Program Manager (PM), is responsible for preparing the FSP; however specific tasks relating to the development of the FSP may be assigned to other team members as appropriate. The PM and Quality Assurance (QA) Officer review the document for approval before sampling begins. The PM review is for conformance to EPA grant requirements, technical accuracy and resource availability; the QA Officer review is for conformance with the *Planning Process* and FSP requirements. The FSP becomes final after approval by the PM and QA Officer. In accordance with the Bureau's QAPP, a copy of this document is placed in the appropriate section of the survey record and is maintained by the Project Coordinator through the completion of the project.

3.0 BACKGROUND AND PRECAUTIONS

For routine water quality surveys conducted by the Monitoring, Assessment, and Standards Section (MASS), the FSP consists 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 Microsoft Excel spreadsheets that

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document the sampling plan for the project, detail the 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 standard operating procedure (SOP) and are available on the Bureau's SOP webpage (<http://www.nmenv.state.nm.us/swqb/SOP/index.html>). For routine water quality surveys, conformance to the Bureau QAPP is sufficient to assure the quality of the data.

Data collection activities that are not part of a routine water quality survey should be planned according to this or a similar process. A project-specific FSP and a Project QAPP (PQAPP) may be required; a project-specific FSP describes the sampling and a PQAPP assures the quality of the data. The FSP and PQAPP may be combined into one document (i.e., Sampling and Analysis Plan). If the PQAPP includes details about sampling locations, the major difference between the PQAPP and the FSP will be that the FSP includes information about resource requirements. In any case, the resources required for the sampling described by either the PQAPP or the FSP should conform to those available and described in the grant workplan or other documentation.

Data collected for purposes other than those described in a FSP or from other sources that might not have the same quality controls as data collected under a FSP are evaluated based on the intended use. The PM and the QA officer are authorized to make a determination regarding whether or not the data quality are adequate for the proposed use or decision.

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.

Quality Assurance Project Plan (QAPP) – a document that addresses the data quality objectives, analytical methodologies, specific quality assurance (QA) and quality control (QC) activities, and laboratory requirements designed to achieve the data quality goals of the project.

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.

5.0 EQUIPMENT AND TOOLS

None.

6.0 PROCESS DESCRIPTION

Technical personnel complete the *Planning Process for Environmental Data Collection Activities* (the *Planning Process*) and prepare a Field Sampling Plan (FSP). The *Planning Process* and the FSP development process and requirements are described below.

6.1 Planning Process for Environmental Data Collection Activities

The Project Team, through the *Planning Process*,

1. Specifies and prioritizes the questions that the study will be designed to answer and the decisions that can be made as a result of the study.
2. 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.

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3. Identifies how the data will be used to support the project objectives.

For routine water quality surveys, the PM assigns the Project Coordinator(s) for the next year's work, typically around November. From that time until the middle of January, the Project Coordinator(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 results of the *Planning Process* are documented in the FSP.

The *Planning Process* leading up to the FSP is as follows:

Responsible Party:

Task:

Program Manager

- * Assigns a person or persons to plan and conduct a water quality survey, study or sampling activity. This person is called the Project Coordinator.
- * Establishes preliminary study goals and may list preliminary questions or decisions to be resolved by the study. Ensures that the Project Coordinators have a copy of the relevant workplan or monitoring strategy, and provides an estimate of the available resources (generally funds and WTUs) and of the anticipated schedule.
- * Assembles the Project Team. Besides the coordinator(s), the team may include appropriate technical staff members from within the Bureau, and contractors or their representatives if some of the sampling will be contracted.

Project Coordinator(s)

- Maintains the project files and coordinates the development and execution of the FSP.
- Leads internal planning meetings to gather input from project team. Schedules planning meetings with other technical staff (e.g., Tribes, USFS, BLM, State Parks, NMDGF, LANL, NWR, etc.) as requested or needed during the *Planning Process*. If the project encompasses Pueblo or Tribal lands a formal letter from the Cabinet Secretary or other senior management, but prepared by the Project Coordinator(s), should be sent to the Tribal Governor informing them of the project and seeking their input in the planning process.
- Produces a list of AUs that possibly require standards revision, and provides this to the Standards Coordinator.
- Develops anticipated schedule and estimates resource requirements.
- Ensures the progress of the project is kept on track and complies with the requirements set forth in the Bureau's Quality Management Plan (QMP) and QAPP. When the project does not comply with QMP and/or QAPP requirements the coordinator(s) will inform the QA Officer and Program Manager and document accordingly.

- Project Team
- Identifies and prioritizes the questions that the study will be designed to answer and the decisions that the study is intended to resolve.¹
Depending on resource requirements and schedule, may postpone the investigation of some study questions for a later date.
 - Ensures the objectives and decision criteria listed in Table 1 (for routine water quality surveys) are consistent with the objectives of the study. With the input of the QA Officer, reviews the data quality requirements of the QAPP to ensure that the requirements are sufficient to answer the study questions.
- Project Team
- Considers possible options for collecting the data (i.e., what type and quantity of data are needed to most effectively answer the study questions?). Documents data collection strategy (frequency and schedule of the data collection events) and the sampling rationale.²

Table 1. Typical SWQB Water Quality Survey Project Objectives

	Collect Water Quality Data to:	Question to be answered	Products/ Outcomes	Decision Criteria
Primary Objective	Assess designated use attainment for the <i>Integrated Report</i> and provide information to the public on the condition of surface water	Are sampled waterbodies meeting water quality standards (WQS) criteria?	Water Quality Survey Summary; Integrated Report	WQS as interpreted by the Assessment Protocols
Secondary Objectives	Develop load and waste load allocations for Total Maximum Daily Loads (TMDLs)	What is the maximum pollutant load a waterbody can receive and meet the requirements of the WQS?	TMDL loading calculations and NPDES permit limits	WQS as interpreted by the Assessment Protocols
	Evaluate restoration and mitigation measures implemented to control non-point source (NPS) pollution	Have watershed restoration activities and mitigation measures improved water quality?	Project Summary Reports, NPS Annual Report, <i>Integrated Report (De-Listing)</i>	WQS as interpreted by the Assessment Protocols

¹ Water quality surveys are the primary means by which data are collected for the Bureau. Therefore it is important that all data needs of the Bureau are considered and, to the extent possible, addressed by the Project Team during the planning process and development of the FSP. It is also important that all data collected are of sufficient quality to be used for multiple purposes throughout the Bureau, such as developing NPDES permit limits, assessing the water quality status of individual waterbodies and watersheds (including monitoring effectiveness of restoration activities), refining water quality standards criteria, and developing TMDLs. The questions and decisions should be stated in such a way that they can be answered with the available data (either existing or collected during the project). The questions and decisions should then be prioritized.

² Through the current rotating watershed survey strategy, SWQB strives for a minimum of four to eight chemical data points for core parameters such as metals and nutrients to make designated use attainment determinations. SWQB also uses thermographs and multi-parameter sondes to generate large datasets for temperature, pH, dissolved oxygen, specific conductance, and turbidity. USEPA does not recommend the use of rigid, across the board, minimum sample size requirements in the assessment process (USEPA 2009). The use of limited datasets is acceptable to USEPA as limited financial, field, and laboratory resources often dictate the number of samples that can be collected and analyzed (USEPA 2002). For other questions, alternative data collection strategies may be applicable and available in other USEPA documents, or may be specified in the workplan.

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Develop or refine surface
WQS

Are the existing uses and
associated criteria appropriate
for the waterbody?

Use Attainability
Analyses (UAA);
Amendments to
NM WQS

Are data sufficient
to support a petition
to the NM Water
Quality Control
Commission to
revise WQS?

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6.2 Field Sampling Plan Development

The FSP serves as the comprehensive plan for each individual project. 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. A summary list of approved FSPs is included as an appendix to the Bureau QAPP.

Preparation of the FSP

The preparation of the FSP begins during the planning phase 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 study. Templates are included as attachments to this SOP and are available on the Bureau's SOP webpage (<http://www.nmenv.state.nm.us/swqb/SOP/index.html>).

FSPs should generally adhere to the following format:

- I. Introduction – Brief introduction to the project that describes the context of the project in relation to the overall Bureau goals and objectives
- II. Project Team – Identifies all project team members and describes their associated roles and responsibilities as specifically as possible
- III. Project Description - Provides background information including project goals and objectives (see Table 1 for routine water quality surveys), a schedule identifying general timelines for project tasks and milestones, and a project description that details the region encompassed by the study along with any additional information such as a list of impaired waters and current TMDLs, historic and current land use practices, geology, NPDES permits, and best management practices/319 projects implemented in project area. This section should also include one or more sampling location maps, as required.
- IV. Documentation - Describes how the 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 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 and biology/habitat sampling. This includes QA sampling as required by the Bureau QAPP, SOPs, or PQAPP as appropriate.

This section should include the following tables:

- A. Stations Lists – Includes pertinent information for each sampling station in the project. This may include the assessment unit (AU) name, water quality standards segment, station name, unique station identification number, location description (latitude/longitude), or station rationale.
- B. 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 QAPP, SOPs, or PQAPP.
- C. Biology/Habitat Sampling Summary – Summarizes where biological and physical habitat data will be collected, including any QA sampling as required by the Bureau QAPP, SOPs, or PQAPP.

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VI. Resource Requirements– Summarizes the resources necessary to complete the project.

This section should include the following tables:

- D. Budget Estimates – Collates budget information from Chemistry and Biology/Habitat spreadsheets to provide estimates pertaining to analytical costs (WTUs for samples submitted to SLD; dollar estimates for contract labs and in-house *E. coli* analysis).
- E. Travel Costs – Summarizes fuel and per diem costs, staff time estimates, and any other anticipated costs necessary to complete the planned sampling.

The process for preparing the FSP is as follows:

Responsible Party: Task:

Project Team

Selects the sampling locations based on the project objectives.

For SWQB, stream segments are termed assessment units (AUs). 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). Below are several factors to evaluate when determining the homogeneity of the AU:

- Are there significant tributaries entering along the reach?
- Are there any changes in geology?
- Are there any dramatic shifts in land use?
- Is there a dramatic change in slope?
- Are there 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?
- Are there any irrigation return flows discharging into the reach?

Existing or historic stations should be reviewed to determine their relevance or to enable the examination of trends. For example, the team may choose not to select stations that are no longer at active discharges, are located within ephemeral waters, or that bracket minor 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.

For lakes, establish one station at the deepest portion of the lake (usually near the dam). For large lakes (greater than 100 acres), sampling may include more than one sampling location. Additional stations may be located, as appropriate, near inlets where different inputs come into the lake or in isolated areas where water quality may differ from the main pool of the lake.

Project Coordinator(s) **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 STORET Station IDs and enter new station information into SQUID prior to any sampling as needed.

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Project Team

Selects the analytes for each sampling location based on project objectives.

For NPDES discharges in general, sample all analytes for which the facility has a permit effluent limit except BOD and any additional parameters for which the receiving water is known to be impaired. In particular:

- Nutrients should be sampled at all wastewater treatment plants (WWTPs) because of many outstanding issues related to nutrients.
- During a NPDES permit issuance - sample for all applicable criteria (with a few exceptions) for purposes of determining reasonable potential.

Determines timing and frequency of sampling based on project objectives.

Chemical sampling typically involves monthly 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.

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 Coordinator(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 survey year to reduce the influence of non-water quality environmental variables such as drought.

Project Coordinator(s)

Estimates the anticipated schedule and resource requirements.

Provide list of needed supplies (e.g., sampling containers, calibration standards, tubing, filters, acids, and any other expendable supplies) to MASS Program Manager.

Documents the Project Team's work and prepares a draft of the FSP by February 1st.

Plans, schedules, and conducts a pre-survey public meeting in the project area (for routine water quality surveys).

The team presents the draft FSP to provide information on why the survey is being conducted, detail the survey data collection efforts, and encourage discussion from the public on all aspects of the project. The coordinator(s) will address all public input received and may modify the FSP as needed.

Submits the Final Draft of the FSP to the PM and QA Officer by March 15th.

Program Manager

Reviews the FSP for conformance to grant workplan requirements, technical accuracy and resource availability; approves, posts on the web, and provides final copy to coordinator(s) for project file.

QA Officer

Reviews the FSP for conformance with FSP SOP requirements and the *Planning Process*; approves and incorporates into the Bureau QAPP.

6.3 Execution of the Field Sampling Plan

After the planning portions of the FSP are finalized, the Project Team implements the plan as defined in the FSP. Project activities including any deviations from the original plan or any issues that arise with any associated corrective actions will be noted on the field forms and entered into SQUID to document progress

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throughout the course of the project. Once the sampling portion has been completed and all data have been verified and validated, this documentation provides the basis for the final project report.

The process for implementing and executing the Field Sampling Plan is as follows:

Responsible Party: **Task:**

Program Manager & QA Officer **Ensure team members conduct sampling in accordance with the developed FSP, QAPP, and current SOPs.** Determine usability of any sampling not in accordance with the FSP, QAPP, or current SOPs.

Project Coordinator(s) & Project Team **Conduct sampling in accordance with the developed FSP, Bureau QAPP, and current SOPs.** Any sampling not in accordance with the FSP, QAPP, or current SOP will be documented and reported to the Program Manager and/or Supervisor.

In addition, sampling for routine water quality surveys shall include:

- a. **Plan sampling trips** at least 2 months in advance to ensure adequate assistance from other bureau staff. Input all planned sampling events into shared calendars (e.g., Outlook, MASS survey calendars, etc) and reserve needed vehicles and equipment for planned sampling dates. Blanket checkouts of vehicles are not permitted.
 - Project Coordinators do not need to go on all sampling runs; however they are responsible for finding staff to accomplish the work. If a project team member has been scheduled to go on a sampling run and cannot go – it is the team member’s responsibility to find a replacement (excluding illnesses and emergencies).
 - All staff should remind immediate supervisor of any planned fieldwork at least one week in advance and notify appropriate SLD sections by email to let them know what samples to expect and when.
- b. Develop clear, concise **driving directions** detailed enough to allow personnel to independently find and access all sampling stations, including contact information and permission if on private property. Enter this information into SQUID following the first round of sampling.
- c. When submitting samples for analysis at SLD, obtain copies of the date and time stamped SLD submittal sheet(s) and provide these copies to the Project Coordinator(s) to file in the project folder. These serve as chain of custody documentation for the project and are required under the Bureau QAPP.
- d. Conduct **probable source** evaluations. Review and revise evaluations at the end of the survey with input from appropriate WPS staff as documented in the Probable Source SOP.
- e. Perform **Level 1 nutrient screening** at all sites during the month of June and complete preliminary nutrient assessments by August 1st.
- f. Deploy at least one **thermograph** in all AUs by May 1st; download data and make a preliminary temperature assessment by August 1st; retrieve deployed thermographs before the end of field season.
- g. **Sample phytoplankton at all lakes.**
- h. Conduct **Hydrology Protocol** evaluations at any WQ station/AU with questionable perennality/hydrology to help determine if WQS are appropriate.
- i. Conduct one **QC Hydrology Protocol field replicate** when Hydrology Protocol evaluations are routinely performed in the study.

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Project Coordinator(s) Conducts **mid-survey meeting** with team to discuss any changes to chemical portions of the study plan.

Project Coordinator(s) &/or Project Team **Collect biological and physical habitat data during biological index period (August 15th – November 15th).**

For routine water quality surveys this will include:

- a. Perform **Level 1 sediment screening** (i.e., pebble count) at one station for all survey AUs. Complete **Level 2 sediment surveys at sites as needed** based on results from the Level 1 screening and field assessment determination. Level 1 and Level 2 surveys should be performed during the same site visit, if possible, to reduce the influence of seasonal (flood/scouring events, block releases, etc.) variability.
- b. Deploy **sonde** and collect **periphyton chlorophyll-a** data at sites identified by the preliminary nutrient assessment or previously listed as impaired due to nutrients.
- c. Collect **SSTEMP habitat data** at sites identified by the preliminary temperature assessment or in need of a temperature TMDL.
- d. As resources allow: sample **benthic macroinvertebrates** at sites previously identified on the 303(d) List with impaired macroinvertebrate communities and/or as needed for criteria development. Sample **fish communities** to support potential WQS changes and/or IBI development. Collect **fish tissue** samples in popular fishing areas within the targeted watershed(s) and/or where contamination issues are known or suspected. Any fish sampling (community composition or fish tissue) must be coordinated with the MASS fish ecologist.
- e. Conduct one **QC field replicate** for habitat data in each study.

Project Coordinator(s) **Enters all data including field notes into SQUID** in a timely manner to document the progress of project activities and any deviations from the original plan. After all lab data has been returned, VV data entered into NMEDAS following procedures outlined in the Data Verification and Validation SOP.

Coordinates and conducts **post-survey meeting** with team to discuss differences between planned and actual sampling and what data gaps, if any, exist.

Project Team Writes assigned sections of water quality survey summary report and/or other grant deliverables required at the end of the project.

Project Coordinator(s) Writes, coordinates, and assembles the **water quality survey summary report** within one year of the end of the survey and/or other grant deliverables required at the end of the project within the time frame defined in the grant requirements.

7.0 RELATED FORMS

FSP Planning Excel workbook
FSP Template

8.0 REVISION HISTORY

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.

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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.

Original (December 15, 2011).

9.0 AVAILABLE RESOURCES AND REFERENCES

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