Quality Assurance Project Plan for Stormwater Quality Monitoring in Compliance with Permit NMR04B000 Santa Fe County

Prepared for

Santa Fe County, New Mexico

Prepared by

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June 9, 2026

Quality Assurance Project Plan for Stormwater Quality Monitoring in Compliance with Permit NMR04B000
Santa Fe County

Project Coordinator Date
Santa Fe County

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List of Acronyms and Abbreviations

ASTM	ASTM International
CFR	Code of Federal Regulations
County	Santa Fe County
DBS&A	Daniel B. Stephens & Associates, Inc.
DQA	data quality assessment
DQI	data quality indicator
DQO	data quality objective
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
FSP	field sampling plan
GIS	geographic information system
LCS	laboratory control sample
MDL	method detection limit
MQO	measurement quality objective
MRL	minimum reporting level
MS	matrix spike
MS4	municipal separate storm sewer system
MSD	matrix spike duplicate
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
PARCC	precision, accuracy, representativeness, completeness, and comparability
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RPD	relative percent difference
SDL	sample detection limit
SOP	standard operating procedure
SWQB	Surface Water Quality Bureau
USGS	U.S. Geological Survey

1. Introduction

Daniel B. Stephens & Associates, Inc. (DBS&A) has prepared this quality assurance project plan (QAPP) for stormwater quality monitoring by the Santa Fe County (County) in accordance with U.S. Environmental Protection Agency (EPA) *Guidance for Quality Assurance Project Plans* (U.S. EPA, 2002) and the *EPA Requirements for Quality Assurance Project Plans* (U.S. EPA, 2001). The County is tasked with the development, execution, and amendment of a monitoring plan as required by the municipal separate storm sewer systems (MS4) (Permit No. NMR04B000) (the EPA MS4 Statewide Permit), which is anticipated to be issued in early 2027).

Figure 1 shows the limits of the urbanized area covered by the Permit, which is County's responsibility.

The purpose of a QAPP is to provide a framework for the collection and analysis of environmental data and to provide guidance for generating data of the precision, accuracy, and completeness necessary for the intended end use of the data. This QAPP addresses the collection of stormwater quality samples. Soil, sediment, or other media sampling are not addressed in this QAPP. The format and contents of this QAPP are modeled after the New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB) QAPP for water quality management programs.

This QAPP references the field sampling plan (FSP) developed for the County for wet weather monitoring. The FSP discusses the wet weather sampling, monitoring, and assessment to be conducted in accordance to the Permit. This QAPP also references standard operating procedures (SOPs). SOPs describe a particular task in detail. The definitions of QAPP and SOP as provided by NMED are as follows:

- *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.
- *Standard operating procedure (SOP)*: A document that lists the detailed steps that should be completed when completing a task.

While the FSP deals specifically with the field activities associated with the collection of water quality samples for wet weather monitoring compliance under the Permit, this QAPP is a

broader document that can be used for any stormwater quality samples or data associated with the County's MS4 Permit compliance activities. The SOPs provide detailed instructions for how to conduct specific activities in compliance with the QAPP and FSP. All SOPs are referenced in the text of this QAPP and provided in Appendix A.

2. Project Management

2.1 Distribution List

The Project Coordinator will provide a copy of the approved QAPP to personnel that conduct or oversee the collection, handling, analysis, and use of water quality data. It will be the responsibility of the Project Coordinator to ensure that the approved QAPP will also be provided to all contractors, laboratories, or other entities conducting work related to the collection, handling, analysis, reporting, and use of water quality data.

The Project Coordinator will ensure that a copy of the approved QAPP is available upon request to other necessary parties involved in water quality monitoring.

2.2 Project/Task Organization

All project activities covered by this QAPP are performed by the County or contractors. The organization and responsibilities are discussed in the following subsections.

2.2.1 Stormwater Quality Program

The Project Coordinator is responsible for collecting and analyzing stormwater quality data and for updating and maintaining the QAPP. All personnel or contractors who collect environmental data are responsible for the implementation of methods and procedures described in this QAPP, and must be familiar with and follow the provisions of this QAPP. The Project Coordinator is responsible for verifying that all data collection, storage, and management activities conducted by County personnel or contractors comply with the provisions of this plan.

2.2.2 Contractors

The County may hire contractors to collect environmental data. Contractors must provide sufficient quality assurance and quality control (QA/QC) information to ensure that the data they collect meet the County's QA/QC requirements, and must follow this QAPP. Each contractor will report and provide data to the Project Coordinator.

Environmental data collected by the County and its contractors are analyzed by independent contract laboratories. Each analytical laboratory must provide QA/QC information and conform to the specifications and requirements of this QAPP. Each contract laboratory will be provided with a copy of this QAPP and will report and provide data to the fiscal agent or designee. Sometimes an analytical laboratory is subcontracted by another contractor. When this occurs, the primary contractor must ensure and document that the laboratory (and all other subcontractors) adhere to this QAPP.

2.3 Problem Definition/Background

2.3.1 Background

EPA published the EPA MS4 Statewide Permit in 2026. It is proposed to replace the 2007 NMR040000 small MS4 National Pollutant Discharge Elimination System (NPDES) permit, which expired in 2012 but was administratively continued. The MS4 Permit authorizes stormwater discharges to waters of the U.S. from large and small MS4s within the State of New Mexico. In New Mexico, stormwater general permits are written, managed, and enforced by EPA Region 6. NMED SWQB assists EPA in regulation of stormwater discharges by performing inspections on behalf of EPA and by serving as a local point of contact for providing information to operators and other agencies regarding this federal regulatory program.

Data collected and used by the County for EPA regulatory compliance will conform to this QAPP.

2.3.2 Problem Definition

As authorized by the Clean Water Act, the NPDES permit program controls water pollution by regulating sources that discharge pollutants into waters of the U.S. Stormwater discharges from MS4s are covered under NPDES general permits. The EPA MS4 Statewide Permit requires the County to conduct regular stormwater quality monitoring and reporting.

The intent of the EPA MS4 Statewide Permit is to protect the water quality of receiving waters, in this case the Santa Fe River, Arroyo Hondo, and Cienga Creek. Water quality can be defined as the physical, chemical, and biological composition of water as related to its intended use for such purposes as drinking, recreation, irrigation, or fisheries.

The water quality monitoring activities conducted by the County are primarily conducted to conform to the requirements of the EPA MS4 Statewide Permit. All water quality data collected by the County are ultimately used to better understand the urban runoff and to inform decisions related to improving the water quality of the Santa Fe River.

2.4 Project/Task Description

The County conducts a variety of environmental activities throughout the calendar year. Specific details of monitoring activities are provided in project-specific plans, including the FSP for wet weather monitoring. Table 1 summarizes County's water quality data collection activities.

2.5 Quality Objectives and Criteria for Measurement Data

The establishment of quality objectives ensures that the County makes decisions relating to stormwater quality management that are:

- Consistent with the mission, goals, and objectives of the County
- Consistent with applicable regulations and permits
- Based on all available pertinent information
- Based on a thorough understanding of the information
- Based on accurate information

Data quality objectives (DQOs) are statements about how confident the decision-maker wants to be about the quality (accuracy) of the data produced. Data collected to support the decisions listed in Table 1 should be of sufficient quality to provide a high level of confidence in the resulting decisions.

Measurement quality objectives (MQOs) are statements about how good the measurements need to be in order to be useful as inputs to the decision process. MQOs are often expressed as statements about the acceptable values of data quality indicators (DQIs).

There are four quantitative DQIs: accuracy, precision, completeness, and sensitivity. Accuracy and precision are monitored by QC samples. Completeness is calculated based on the required number of samples. Sensitivity is monitored through instrument calibration and the determination of method detection and reporting limits. The three qualitative DQIs—bias, representativeness, and comparability—are assessed through the sample design process and selection of methods.

Analytical results for stormwater samples will be evaluated in accordance with precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters, as well as sensitivity parameters to document the quality of the data. Of these PARCC parameters, precision and accuracy will be evaluated quantitatively by collecting the QC samples listed in

Table 2. Acceptance criteria for these samples are provided in Table 3. The following subsections describe each of the PARCC parameters and how they will be assessed.

2.5.1 Precision

Precision is the degree of mutual agreement between individual measurements of the same property under similar conditions. Combined field and laboratory precision is usually evaluated by collecting and analyzing field duplicates and then calculating the variance between the samples, typically as a relative percent difference (RPD).

RPD is calculated as follows:

$$RPD = \frac{|A - B|}{(A + B)/2} \times 100\%$$

where A = First duplicate concentration
B = Second duplicate concentration

Field sampling precision is evaluated by analyzing field duplicate samples. A duplicate sample is typically identical to the original sample. The purpose of a duplicate sample is to gain information on the sample homogeneity, possible field variations, handling, storage and preparation, and analysis. The duplicate sample is collected at the same time and location as the original environmental sample. The identity of the blind duplicate sample (i.e., to which original sample it corresponds) is unknown to the laboratory to which it is submitted.

As noted above, the format and contents of this QAPP are modeled after the NMED SWQB QAPP for water quality management programs. SWQB may collect duplicates for chemical sampling as needed for special investigations. However, SWQB does not routinely collect duplicate samples and instead relies on standard procedures and laboratory QA to ensure the repeatability of the data. EPA's QAPP guidance (U.S. EPA, 2002) suggests collecting field duplicate samples at a frequency of 1 duplicate for every 20 samples or fewer.

For County monitoring, one field duplicate sample will be collected per year. The project task scope of work details the sample parameter list for each site. Field duplicates are to be analyzed for constituent(s) with an established acceptance criterion noted on Table 3. The sample parameter list may vary by site, and may only include one analysis (i.e., E. coli). The duplicate sample should be collected for a monitoring site that includes analysis of the majority of parameters detailed in the project task scope of work.

Laboratory analytical precision is evaluated by analyzing laboratory duplicates or matrix spike (MS) and matrix spike duplicate (MSD) samples. For this project, MS/MSD samples will be generated for all analytes. The results of the analysis of each MS/MSD pair will be used to calculate the RPD as a measure of laboratory precision.

2.5.2 Accuracy

A program of sample spiking will be conducted to evaluate laboratory accuracy. This program includes analysis of the MS and MSD samples, laboratory control samples (LCSs) or blank spikes, surrogate standards, and method blanks. MS and MSD samples will be prepared and analyzed at a frequency of 5 percent. LCSs or blank spikes are also analyzed at a frequency of 5 percent. Surrogate standards, where available, are added to every sample analyzed for organic constituents. The results of the spiked samples are used to calculate the percent recovery for evaluating accuracy.

$$\text{Percent Recovery} = \frac{S - C}{T} \times 100\%$$

where S = Measured spike sample concentration
C = Sample concentration
T = True or actual concentration of the spike

2.5.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristics of a population, variations in a parameter at a sampling point, or an environmental condition that they are intended to represent. For this project, representative data will be obtained through careful selection of sampling locations and analytical parameters. Representative data will also be obtained through proper collection and handling of samples to avoid interference and minimize contamination.

Representativeness of data will also be ensured through the consistent application of established field and laboratory procedures. Field blanks and laboratory blank samples will be evaluated for the presence of contaminants to aid in evaluating the representativeness of sample results. Data determined by comparison with existing data to be non-representative will be used only if accompanied by appropriate qualifiers and limits of uncertainty.

2.5.4 Completeness

Completeness is a measure of the percentage of project-specific data that are valid. Valid data are obtained when samples are collected and analyzed in accordance with QC procedures outlined in this QAPP, and when none of the QC criteria that affect data usability are exceeded.

When all data validation is completed, the percent completeness value will be calculated by dividing the number of usable sample results by the total number of sample results planned for this investigation.

2.5.5 Comparability

Comparability expresses the confidence with which one dataset can be compared with another. Comparability of data will be achieved by consistently following standard field and laboratory procedures and by using standard measurement units in reporting analytical data.

2.5.6 Detection and Quantitation Limits

The method detection limit (MDL) is the minimum concentration of an analyte that can be reliably distinguished from background noise for a specific analytical method. The quantitation limit represents the lowest concentration of an analyte that can be accurately and reproducibly quantified in a sample matrix.

The EPA MS4 Statewide Permit requires that the analytical methods and detection limits conform to the standards listed in Code of Federal Regulations (CFR) 40 Part 136. The analytical methods used by independent contract laboratories should be determined before sample collection to ensure that the methods provide the precision, accuracy, and completeness necessary for the intended end use of the data. The MDL for each analyte will be listed as the detection limit in the independent contract laboratory's hard copy analytical data package and the electronic data deliverable (EDD).

2.6 Special Training/Certifications

Although no special certification is required to implement this QAPP, proper training of field personnel represents a critical aspect of QC. All County personnel and contractors with the responsibility of collecting water quality data will have sufficient training and experience. Additionally, all newly hired personnel will undergo a period of apprenticeship and be accompanied by experienced staff when collecting samples or field measurements until the Project Coordinator determines that the staff person is appropriately trained and qualified to

collect quality data. On occasion, interns may assist with data collection efforts and are directly supervised by qualified staff throughout the course of data collection efforts.

All County personnel and contractors who are responsible for collecting and/or managing water quality data/information and producing planning or reporting documents are required to be familiar with this QAPP and the most current associated SOPs for data collection.

Many of the data collection and analytical methods and procedures used by the County are based on or have been adapted from methods and procedures developed by other entities such as NMED or EPA. Workshops, conferences, and other types of training and educational forums on these methods and procedures are offered periodically. As resources allow, County personnel or contactors are encouraged to seek out and attend appropriate training events.

2.7 Documentation and Records

This QAPP and referenced procedures include methods related to the collection, processing, analysis, reporting, and tracking of stormwater quality data. This QAPP is updated as needed by the Project Coordinator and made available to County personnel and their contractors responsible for collecting, processing, and analyzing data.

Data generated from projects covered by this QAPP must be of sufficient quality to withstand challenges to their validity, accuracy, and legibility. To meet this objective, data are recorded in standardized formats and in accordance with prescribed procedures. The documentation of all environmental data collection activities must meet the following minimum requirements:

- Data and associated information must be documented directly, promptly, and legibly. All reported data must be uniquely traceable to the raw data via sample name, date, and time of collection. Data reduction/transformation formulas must be documented.
- All original data records include, as appropriate, a description of the data collected, units of measurement, unique sample identification, station or location identification, name of the person collecting the data, and date of collection.
- Any changes to the original (raw data) entry must not obscure the original entry. The reason for the change must be documented, and the change must be initialed and dated by the person making the change and approved by the Project Coordinator.

2.7.1 Documentation of Planning Processes

Each sampling event is planned through a process that may be documented in a variety of different ways depending on the project. These documents may include work plans, joint power agreements, contracts, and project-specific FSPs. All documents and plans must meet the requirements specified in this QAPP. The Project Coordinator is responsible for ensuring that the planning process is documented.

2.7.2 Documentation of Data Collection (Field) Activities

Records are maintained for each data collection activity to ensure that samples and data are traceable and defensible. Field records will be documented on forms or notebooks to provide a secure record of field activities, observations, and measurements during sampling. Entries are never erased and pages are never removed. Mistakes are lined out and initialed by the data recorder. Completion of appropriate field documentation and forms for each sample is the responsibility of the Project Coordinator or designee.

2.7.3 Documentation of Analytical (Laboratory) Activities

Documentation of all water quality samples to be analyzed by an external laboratory is critical for tracking data and evaluating the success of any activity. Each analytical laboratory is required to provide County with a copy of their current QAPP (or equivalent) and must meet the requirements specified in this QAPP. Documentation may include, but is not limited to, the following:

- Calibration and maintenance records for all instruments and equipment involved in the collection of environmental data
- Records of preparation of calibration standards, spiking solutions, and dosing solutions such that each unique preparation can be tracked to the original (neat) material
- Records of all sample processing or preparation for testing such that it is traceable to sample receipt records
- All sample analysis request forms and results of analyses (all rejected data are accompanied by explanations of the failure and the corrective action)
- All data reduction/transformation formulas such that reported data can be reproduced from the raw data

2.7.4 Regulatory Reporting

The County will include a report on stormwater quality monitoring in their annual MS4 report to the EPA. The report will include a summary of the results, field and sampling procedures, and associated QC data, conclusions, and recommendations.

3. Data Generation and Acquisition

This section provides information on how water quality data are obtained and managed by the County and their contractors. The guidelines specified in this section were developed to ensure that data collected are appropriate and reliable and of sufficient quality to fulfill the project goals and objectives.

3.1 Sampling Process (Experimental) Design

Sampling process design for water quality monitoring is based on meeting regulatory requirements and/or evaluating conditions within the monitoring area. Plans for work conducted under this QAPP include detailed information on sampling locations, sampling frequencies, dates/time frames, and sample size.

The sampling process design for projects implemented under this QAPP will vary depending on the objectives of the project; however, the majority of the sampling done by the County and their contractors is based on either a prescriptive regulatory requirement or a judgmental sampling design. Judgmental sampling design is the selection of sampling locations, dates, parameters, and frequencies based on knowledge of the features and conditions under investigation and on professional judgment, with no randomization.

3.2 Sampling Methods

Methods of sample collection, preservation, and handling used in determining water quality as a part of this QAPP shall be in accordance with methods described in the following references or otherwise approved by EPA:

- "Guidelines establishing test procedures for the analysis of pollutants under the Clean Water Act," 40 CFR Part 136 or any test procedure approved or accepted by EPA using procedures provided in 40 CFR Parts 136.3(d), 136.4 and 136.5

- *Standard Methods for the Examination of Water and Wastewater*, latest edition, American Public Health Association
- *Methods for Chemical Analysis of Water and Waste*, and other methods published by EPA Office of Research and Development or Office of Water
- *Techniques of Water Resource Investigations of the U.S. Geological Survey* (USGS)
- Annual Book of ASTM International (ASTM) Standards. Volumes 11.01 and 11.02, Water (I) and (II), latest edition, ASTM International
- Federal Register, latest methods published for monitoring pursuant to Resource Conservation and Recovery Act regulations
- *National Handbook of Recommended Methods for Water-Data Acquisition*, latest edition, prepared cooperatively by agencies of the U.S. government under the sponsorship of the USGS
- Federal Register, latest methods published for monitoring pursuant to the Safe Drinking Water Act regulations

Detailed procedures for collecting water quality data are provided in the attached SOPs (Appendix A). All field activities will be conducted in accordance with the SOPs.

3.3 Sample Handling and Custody

This section describes County's procedures to ensure that each sample collected retains its original physical form and chemical composition from time of collection through final disposal.

3.3.1 Sample Handling

The details of the sample handling procedures and copies of all compliance monitoring are found in the SOPs.

3.3.2 Sample Custody

A formal chain of custody is required for all samples collected. The chain of custody is intended to document and ensure the integrity of samples. Samples collected shall follow the chain of custody procedures provided by the contracted analytical laboratory.

3.4 Analytical Methods

Analytical methods used under this QAPP shall be in accordance with 40 CFR Part 136, as specified in the Permit, as appropriate, or as otherwise approved by EPA. The FSP includes a list of analytical methods that conform to the requirements of 40 CFR Part 136. Analytical methods used under this QAPP shall be in accordance with current EPA Region 6 minimum quantification levels (MQLs) for reporting and compliance as specified in Appendix B of the Permit.

Analytical procedures used by contract laboratories must be provided to County in their approved QAPP or equivalent. Analytical methods used by contract laboratories must be in accordance with the procedures listed above.

3.5 Quality Control

QC is the system of technical activities, including data verification and validation procedures, that measure the attributes and performance of a process, item, or service against defined standards.

Various field and laboratory QC samples and measurements will be used to verify that analytical data meet the QA objectives. Field QC samples and measurements will be collected to assess the influence of sampling activities and measurements on data quality. Similarly, laboratory QC samples will be used to assess how the laboratory's analytical program influences data quality. This section describes the QC samples that are to be analyzed during the site sampling activities. Table 2 specifies the frequency of QC samples to be collected at the site. Table 3 lists the acceptance criteria for each parameter.

3.5.1 Field Quality Control

Newly hired County field personnel and contractors will learn sampling techniques through training and apprenticeship with experienced personnel. The County controls the quality of the data by using standardized methods that are documented in the most current SOPs. All personnel that collect environmental data must be familiar with these protocols and collect data in accordance with the procedures as they are defined in the SOPs.

Field QC samples will be collected and analyzed to assess the quality of data that are generated by sampling activities. These samples will include laboratory QC samples collected in the field, field duplicates, equipment rinsates, MS/MSDs, and trip blanks.

3.5.2 Blanks

A blank sample is a sample that is processed and handled in the same manner as the associated environmental sample and is intended to be free of the analytes of interest. The following types of QC blank samples are used by County and their contractors:

- *Field Blank:* Field blanks are not collected for the County wet weather monitoring, but may be collected on a project-specific basis. A sample of distilled and deionized water that is prepared in the field without use of sampling equipment. An aliquot of deionized water is placed in a clean sample container in the field. Field blanks are treated as regular samples in all respects, including exposure to sampling station conditions, storage, preservation, and filtration, if applicable. The purpose of these samples is to determine if any of these conditions or processes have caused sample contamination.
- *Equipment Blank:* A sample of distilled and deionized water that is prepared in the field using the appropriate sampling equipment. An aliquot of distilled and deionized water is processed using applicable field equipment in the same manner as environmental samples. Equipment blanks are used to demonstrate that sample collection equipment and sample processing equipment are not introducing contamination. Equipment blanks can be prepared for individual pieces of collection and processing equipment.

3.5.3 Field Replicates and Duplicates

The County and their contractors will collect field duplicate samples but will not collect field replicates. Field replicates are independently collected samples or measurements taken as close as possible to the same point in space and time. Replicates are not included in this sampling effort because they do not effectively distinguish between environmental variability and sample collection or analytical error. Additionally, replicate data do not provide decision-relevant information for other samples collected during the same sampling event.

In contrast, a field duplicate is defined as a single sample that is split into two portions, which are then submitted and analyzed as separate routine samples. Field duplicate samples are to be analyzed for constituent(s) with an established acceptance criterion noted on Table 3.

3.5.4 Laboratory Quality Control

All samples will be analyzed by laboratories that have established QA programs that implement the following key elements:

- Demonstrate the laboratory's capability and qualifications to perform environmental analyses by summarizing and documenting the QA procedures employed by the laboratory.
- Control laboratory operations by establishing procedures that measure the laboratory's performance on a daily, weekly, monthly, quarterly, and yearly basis.
- Measure matrix effects to determine the effect of a specific matrix on method performance and analyte recoveries.
- Provide a means of ensuring that appropriate QC information is consistent, available, and recoverable to enable the end user to assess the quality of the data.

Statistical criteria used by the contract laboratories for validating and expressing the variability of analytical results are described in the QAPP or equivalent that is provided by each laboratory.

3.6 Instrument/Equipment Testing, Inspection, and Maintenance

3.6.1 Field Operations

All field equipment must be inspected and refurbished as necessary before each sampling event. Complete procedures for operating and maintaining equipment are contained in the manufacturer's instruction manual for each instrument. Results of equipment inspections will be noted in the file for each instrument. Any deficiencies in equipment must be noted in the field notes in the file and reported immediately to the appropriate person, who will recheck the equipment and arrange for repair by the manufacturer or replacement. The County and their contractors will not use equipment if the working condition of the equipment is in doubt.

3.6.2 Laboratory Operations

Information regarding analytical equipment and associated maintenance used by contract laboratories is provided in the laboratory's QAPP or equivalent.

3.7 Instrument/Equipment Calibration and Frequency

The specific brand and model of instrumentation used by the County and their contractors will vary. Instrument calibration must be conducted in accordance with the equipment manuals. Calibrations will be checked and documented in field notebooks at a frequency of no less than once per sampling day.

3.7.1 Field Operations

Complete procedures for calibrating instruments (such as pH, electrical conductivity, temperature, and dissolved oxygen meters) used for collecting environmental measurements are contained in the manufacturer's instruction manual for each instrument. All personnel using field equipment are expected to read and be thoroughly familiar with all procedures detailed in these manuals. In particular, sampling personnel shall follow the calibration procedures given by the instrument manufacturer. A calibration log shall be kept for each instrument. Monitoring staff shall routinely enter dates of calibration, calibration methods used, and any other pertinent data (e.g., erratic instrument behavior) in the logbook.

3.7.2 Laboratory Operations

Analytical instruments and equipment used by the contract laboratory are calibrated prior to each instrument analysis batch using manufacturer's recommended procedures and the guidelines provided in the *Handbook for Analytical Quality Control* (U.S. EPA, 1979). All calibration procedures are validated and documented by the contract laboratory and are described in the laboratory's QAPP or equivalent.

3.8 Data Acquisition Requirements

Data collected by individuals or organizations other than the County must, at a minimum, meet the QA/QC requirements described in this document. The project coordinator will determine whether the data meet these requirements. Specifically, the data must be accompanied by a QAPP (or equivalent) under which it was collected. Analytical methods used must meet the requirements specified in Appendix B of the EPA MS4 Statewide Permit, and the methods of data collection must be the same as, or comparable to, those included in the most current SOPs (Appendix A). Additionally, the QC criteria used to verify and validate the data must be the same as, or similar to, those listed in Table 3 and the data verification and validation SOP.

3.9 Data Management

When appropriate, the data will be obtained from the analytical service provider in the form of an EDD, in addition to the required hard copy analytical data package. Formal verification of data will be conducted before associated results are presented or used in subsequent activities.

Data tracking is essential to ensure timely, cost-effective, and high-quality results. Data tracking begins with sample chain of custody. When the analytical service provider receives custody of the samples, the provider will send a sample acknowledgment. The sample acknowledgment

will confirm sample receipt, condition, and required analyses. The chain of custody forms will contain all pertinent information about each sample and can track the data at each phase of the process.

All data collected by the County and their contractors will be maintained in either hard copy or electronic formats, depending on how the data were received from the laboratory, by the County or designee using the appropriate data management tools. These tools consist of databases, geographic information systems (GIS), spreadsheets, and statistical and word processing computer software.

All chemical analytical results received by County must include the following information:

- Data source (the laboratory code from which the data originated)
- Unique sample location ID (specific to location)
- Unique sample ID
- Sample collection date
- Sample collection time
- Laboratory sample number
- Sample analysis date
- Sample analysis time
- Analytical method
- Analyte suite
- Analyte name
- Chemical abstracts service reference number (CASRN)
- Concentration units
- Method detection limit (MDL): The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero
- Minimum reporting level (MRL): The lowest concentration that can be reported
- Sample detection limit (SDL): The sample specific detection limit (equal to [dilution factor x MDL (organics)] or [dilution factor x MRL (inorganics)]).
- Result concentration value and laboratory qualifier codes

Numerical results should be reported in number format (not numbers in text format), with the maximum number of appropriate significant figures possible (typically 2 to 3, depending on laboratory section/instrument).

All paper data should be filed and labeled in a consistent manner. Project-specific data are filed as specified in each data management section below. If applicable, paper copies of project-specific data and associated materials are maintained in a project binder.

Electronic data are initially managed on individual computers. These data should be filed and labeled in a consistent manner using a dedicated filing system. Name each file within each folder as clearly as possible, typically including the project title and year and any other descriptors to help identify what is included in the file. All data housed on individual computers should be backed up on a weekly basis at a minimum.

3.9.1 Field Data (Physico-Chemical Data)

Field data originate when the data are collected and recorded directly onto field sheets. Field data include direct observations recorded by technical staff and data recorded immediately by various equipment (e.g., sondes and other meters). Field data only include instantaneous readings, and do not include long-term deployment data that are electronically downloaded from recording devices. Original field forms are maintained by County or designee. Data from the field forms are entered into a spreadsheet by County or designee. Once the data are in the spreadsheet, they are verified and validated in accordance with the procedures set forth in the data verification and validation SOP. The data are usable following the completion of the data verification and validation process, and are then indicated as "verified and validated" in the spreadsheet. County and their contractors have direct access to the data via the database.

3.9.2 Chemical Analytical Data

Chemical analytical data originate when the contracted analytical laboratory produces analytical results from the water samples submitted by County and their contractors. Chemical analytical data include measurements from the water column of chemical parameters such as ions, nutrients, metals, volatile organic compounds, and radionuclides. Analytical results are provided in both paper copy and/or electronic files, depending on the laboratory and/or parameters.

When chemical analytical data are received back from the laboratory in paper format, the data are entered into a spreadsheet by the designated project member. If applicable, paper copies of data are maintained. When data are received from the analytical laboratory in electronic

formats, they are forwarded to County or their contractor for upload to the spreadsheet. Wherever possible, electronic data transmittal from the laboratory is preferred over paper.

The County or their contractor performs an initial QA audit of the reported detection flags and then informs project personnel when all uploads have been completed. Once the data are in the spreadsheet, they are verified and validated by the designated project member in accordance with the procedures set forth in the data verification and validation SOP. The data are usable following the completion of the data verification and validation process, and are then indicated as "verified and validated" in the spreadsheet. County and their contractors have direct access to the data through the spreadsheet.

3.9.3 Bacteriological Data

Bacteriological (E. coli) data originate when the contracted analytical laboratory produces analytical results from the water samples submitted by the County. Bacteriological data received from analytical laboratories are managed in the same way as chemical analytical data (Section 3.9.2). The data are usable following the completion of the data verification and validation process, and are then indicated as "verified and validated" in the database.

4. Quality System Assessment and Oversight

4.1 Quality System Assessment and Response Actions

Field sampling and measurement techniques are continually undergoing review and modification. It is envisioned that all County procedures will continue to evolve and be refined. Techniques will never be considered "final," but will always be examined for possible improvements. The findings of procedural evaluations should be shared and discussed with County field personnel and contractors. Decisions will be made by managers, with input from field staff, whether to continue with existing methods and techniques, switch to new methods and techniques, or use combinations of both. Any changes to procedures covered or referenced by this QAPP will be documented and reflected in future revisions to the document.

Procedural changes may be made by staff during the field season with concurrence of the County Project Coordinator when the need arises, and will subsequently be documented in the revised QAPP and SOPs. The collection of high-quality and representative data is the most important consideration. It is important that all County staff and their contractors communicate throughout the entire survey process, from initial planning to final report publication.

At the end of each field season (i.e., annually), data are verified and validated by the County or contractor using the data verification and validation SOP to determine variability and data usability. The County and/or contractors will work with the appropriate staff and summarize QA issues periodically. Problem areas will be identified through this process, and the County Project Coordinator will work to take corrective action. QA reports prepared by contract laboratories further help to determine accuracy and the limits of the data. Because analytical methods are continuously becoming more sensitive, this communication process is vital and ongoing.

4.2 Reports to Management

The County and their contractors are responsible for maintaining and completing the applicable Data Verification and Validation Worksheet(s). The County and their contractors, in conjunction with appropriate laboratory staff, will determine if any corrective actions are necessary. Upon request, laboratories will submit a summary of data accuracy and precision, results of performance and system audits, and discussion of significant QA problems and recommended solutions. The County and their contractors will periodically compile a summary report of all QA/QC issues encountered. Any adopted changes will be subsequently reflected as changes to this QAPP.

5. Data Validation and Usability

Guidelines for using qualified data are provided in the assessment protocols (NMED SWQB, 2024). Assessment protocols are the methods and procedures used to evaluate whether the data collection and project processes meet predefined quality requirements. They are a critical part of ensuring that the data generated are defensible, accurate, and reliable. All data collected by the County and their contractors will undergo a series of checks to ensure that the data are of sufficient quality and conform to a project's specific objectives. QC samples and QC criteria are listed in Table 3.

5.1 Data Review, Verification, and Validation

Data review, verification, and validation are key steps for ensuring the integrity, suitability, and usability of the data. All field and analytical data are continually reviewed by the County or their contractor and verified and validated according to the SOPs. Results from the data verification and validation process are summarized on the data verification and validation worksheet and maintained in the project file. The County Project Coordinator will resolve data quality issues.

All information pertaining to this process will be documented thoroughly and maintained in the project file.

5.2 Verification and Validation Methods

The data verification and validation procedures conducted by the County are described in the data verification and validation SOP. This process establishes the criteria for accepting, rejecting, or qualifying data. The data verification and validation worksheet serves as the summary of results for each type of data verified and validated.

These worksheets serve as a record for the County, who will resolve any data quality issues. County will also periodically use the information provided in the data verification and validation worksheet to prepare a summary of the issues that arose and resulting resolution status. All information pertaining to this process is documented and included in the project file. Data validation and verification procedures and associated acceptance criteria used by a contract analytical laboratory are described in the QAPP (or equivalent) as provided by each laboratory. Statistical criteria used by the laboratory for validating and expressing the variability of analytical results are the standard deviation, coefficient of variation, range, 95 percent confidence limits, and control charts.

All data not meeting the appropriate QA/QC requirements as identified through the data verification and validation process are assigned appropriate laboratory qualifier or County validation codes. Laboratory and County codes are summarized in the data verification and validation SOP.

5.3 Reconciliation with User Requirements

Data are considered usable once the data verification and validation process has been completed and the data have been accepted, rejected, or qualified. The County uses the data to meet the objectives described in Section 2 of this QAPP. Guidelines for using qualified data are provided in the assessment protocols (NMED SWQB, 2024). In general, data rejected (i.e., with a data qualifier of "R," "R1," "R2," etc.) are considered unusable for ambient/assessment or compliance purposes. Other data that are qualified (as specified by qualifier or validation code), but not rejected, may be used provided the potential uncertainties associated with the data are addressed and appropriate caveats are attached.

References

New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB). 2024. *Quality assurance project plan for water quality management programs*.

NMED SWQB. 2025. Standard operating procedures for sample collection and handling. Most recent versions of SOPs accessed April 2025 at <http://www.nmenv.state.nm.us/swqb/SOP>.

U.S. Environmental Protection Agency (EPA). 1979. *Handbook for analytical quality control in water and wastewater laboratories*. EPA 600/4-79-019. Available at <http://www.epa.gov/region6/qa/qadevtools/mod4references/analytical_references/qc_handbook.pdf>.

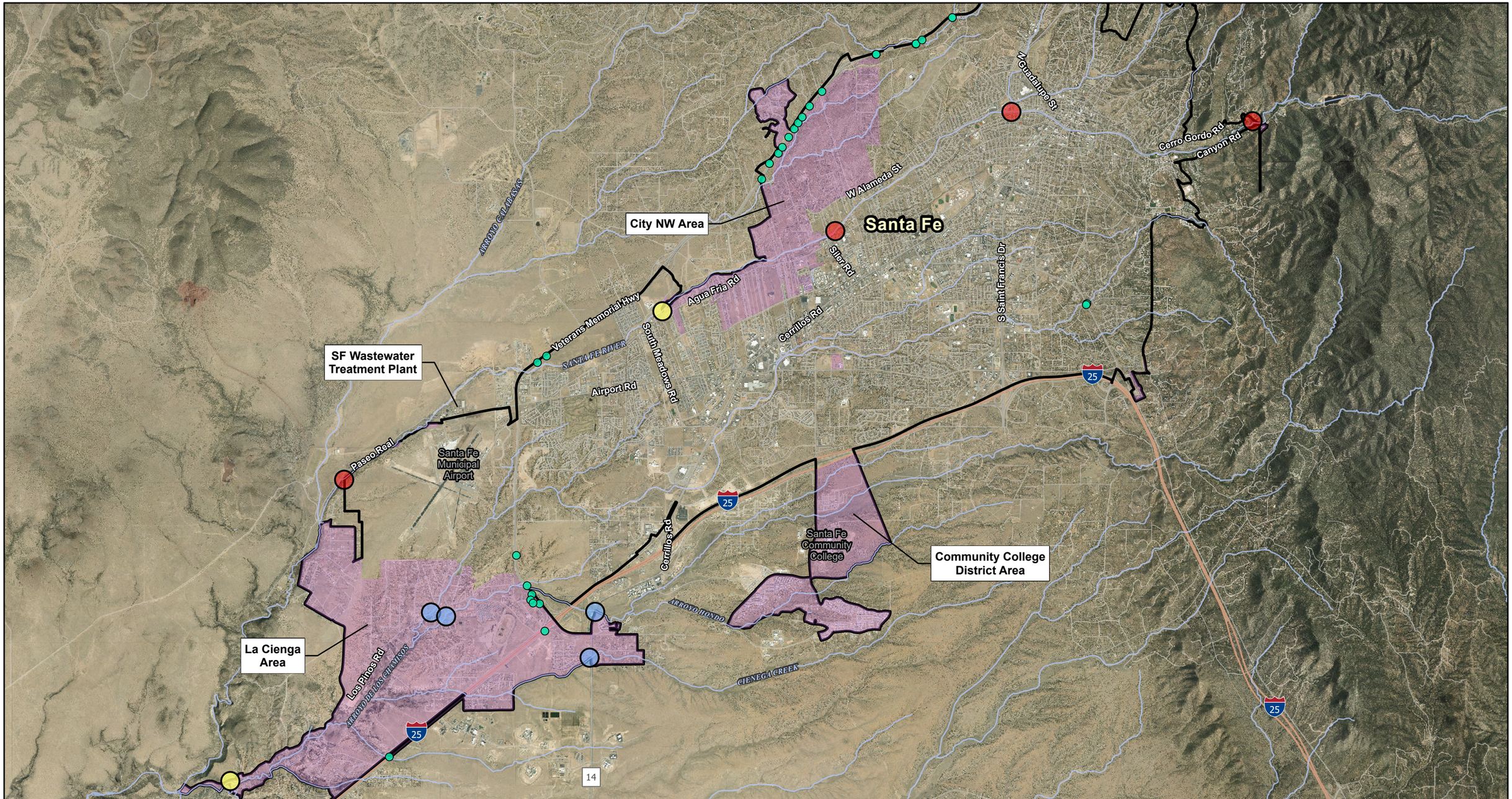
U.S. EPA. 2000. *Guidance for data quality assessment: Practical methods for data analysis, EPA QA/G-9*. July 2000. EPA/600/R-96/084.

U.S. EPA. 2001. *EPA requirements for quality assurance project plans, EPA QA/R-5*. EPA/240/B-01/003. March 2001. Available at <http://www.epa.gov/quality/qs-docs/r5-final.pdf>.

U.S. EPA. 2002. *EPA guidance for the preparation of quality assurance project plans, EPA QA/G-5*. EPA/240/R-02/009. December 2002. Available at <http://www.epa.gov/quality/qs-docs/g5-final.pdf>.

U.S. EPA. 2026. New Mexico Municipal Separate Storm Sewer System (MS4) Permit. NPDES Permit No. NMR04B000.

Figure



SANTA FE COUNTY

Bohannan Huston
www.bhinc.com 800.877.5332

- Santa Fe County MS4 Jurisdiction
- 2021 Census Urbanized Area
- Stream
- NMDOT MS4 Stormwater Outfall Location
- Potential City of Santa Fe Monitoring Location
- Potential Santa Fe County - NMDOT Joint Monitoring Location
- Potential Contingency Location for Santa Fe County - NMDOT Joint Monitoring

N

0 0.63 1.25 2.5 Miles

1 in = 1.25 mi

Santa Fe County Stormwater Monitoring Program Recommendations

Figure 1
Proposed Wet Weather Monitoring Locations

P:\20230082\WRARCGIS\Maps\20230082_SantaFeCountyMS4_Map\20230082_SantaFeCountyMS4_Map.aprx
Author: mcrooks

May 2026

Tables

Table 1. Water Quality Data Collection Activities

Type of Monitoring	Monitoring Category	Monitoring Objective	Question or Decision	Decision Criteria	Sampling Strategy	Products/Outcomes
NPDES Permit Compliance Evaluation	Special Conditions – Water quality standards (WQS)	Ensure that discharges do not contribute to exceedances of water quality standards in the Santa Fe River.	Are discharges meeting WQS criteria?	WQS as interpreted by the Assessment Protocols.	Targeted Monitoring - Collection and evaluation of environmental data from sites selected based on known or suspected influences on water quality (both natural and anthropogenic) to define water quality in a specific segment or region and at the same time, and to partition out potential sources and causes of impairment.	Report data, provide recommendations to improve conditions.
	Special Conditions – Total maximum daily loads (TMDLs)	Ensure that discharges from the County MS4 do not contribute to exceedances of TMDL standards in the Santa Fe River.	Are discharges meeting TMDL criteria for E. coli?	TMDLs as interpreted by the Assessment Protocols.	Targeted Monitoring - Collection and evaluation of environmental data from sites selected based upon known or suspected influences on water quality (both natural and anthropogenic) to define water quality in a specific segment or region and at the same time, and to partition out potential sources and causes of impairment.	Report data, provide recommendations to improve conditions.
	Special Conditions – Endangered Species Act (ESA) requirements	Ensure that discharges from County facilities are not likely to jeopardize the continued existence of endangered species.	Are discharges contributing to adverse conditions for endangered species?	WQSs as interpreted by the Assessment Protocols.	Targeted Monitoring - Collection and evaluation of environmental data from sites selected based upon known or suspected influences on water quality (both natural and anthropogenic) to define water quality in a specific segment or region and at the same time, and to partition out potential sources and causes of impairment.	Report data, provide recommendations to improve conditions.
	Illicit Discharge Detection and Elimination	To identify for the purpose of elimination, any illicit discharges. occurring into the County MS4.	Are illicit discharges occurring? Can point sources be identified? Can non-point sources be identified?	Screening results.	Reconnaissance Inspection - A visual inspection over a large area to look for illicit discharges emanating from specific locations. Water Quality Surveys - Water quality sampling of a localized or general area. The fundamental goal of this design is to comprehensively assess all possible sources within a defined localized area. It is dependent on the ability to identify and locate potential sources of illicit discharge prior to and during screening.	Report findings, develop methods to eliminate illicit discharge. Conduct future inspections to verify compliance.
	Industrial and High Risk	To identify for the purposes of elimination any discharges emanating from high risk areas that contain contaminants of concern.	Can discharges from high risk areas with contamination be identified and eliminated?	WQS as interpreted by the Assessment Protocols.	Reconnaissance Inspection - A visual inspection over a large area to look for illicit discharges emanating from specific locations.	Report findings, develop methods to eliminate discharge.
	Dry Weather Discharge Screening	To characterize the quality of stormwater within and at discharge points of the County MS4 during dry season (non-storm based) conditions.	What is the presence and source of any flow, and do its visual, physical, or chemical characteristics indicate a potential non-stormwater or illicit discharge?	WQS as interpreted by the Assessment Protocols. TMDLs as interpreted by the Assessment Protocols.	Targeted Monitoring - Collection and evaluation of environmental data from sites selected based upon known or suspected influences on water quality (both natural and anthropogenic) to define water quality in a specific segment or region and at the same time, and to partition out potential sources and causes of impairment.	Report data, provide recommendations to improve conditions.
	Wet Weather Monitoring	To characterize the quality of stormwater within and at discharge points of the County MS4 area during storm events.	What are contaminant concentrations and loads during storm events?	WQS as interpreted by the Assessment Protocols. TMDLs as interpreted by the Assessment Protocols.	Targeted Monitoring - Collection and evaluation of environmental data from sites selected based upon known or suspected influences on water quality (both natural and anthropogenic) to define water quality in a specific segment or region and at the same time, and to partition out potential sources and causes of impairment.	Report data, provide recommendations to improve conditions.
Effectiveness Monitoring	BMP and Program Effectiveness	To determine the effectiveness of specific BMPs at improving water quality.	Is the water quality upstream of a BMP worse than it is below the BMP?	Water quality data evaluation.	Collection and evaluation of environmental data to monitor and model changes in physical, chemical, and biological water quality indicators. Upstream/downstream sample locations.	Report results, implement BMP elsewhere or discontinue use.

Table 2. Frequency of Field Quality Control Samples

Field Quality Control Sample	Type	Frequency	Acceptance Criteria
Field duplicate [a]	Field	1 per year	Analyte specific, see Table 3
Equipment blank	Field	1 per year	Analyte specific, must be below laboratory reported detection limit
Matrix spike/matrix spike duplicate (organics only)	Laboratory	1 per 20 samples	Analyte specific, see Table 3
Matrix spike/matrix duplicate (inorganics only)	Laboratory	1 per 20 samples	Analyte specific, see Table 3
Temperature blank	Field	1 per cooler	Less than 6°C

[a] Field duplicate to be analyzed for constituent(s) with an established acceptance criterion noted on Table 3.

Table 3. Acceptance Criteria for QA/QC Samples

Constituent	Acceptance Criteria	
	RPD (Duplicate) (%)	Accuracy (Spike) (%)
Dissolved oxygen	No established criteria	No established criteria
Temperature	No established criteria	No established criteria
pH	No established criteria	No established criteria
Electrical conductivity	No established criteria	No established criteria
Turbidity	No established criteria	No established criteria
Total dissolved solids (TDS)	15	80–120
Total suspended solids (TSS)	15	82.47–119.05
Carbonaceous oxygen demand (COD)	5	90–110
5-day biochemical oxygen demand (BOD_5)	35.5	77.5–136
E. coli	No established criteria	No established criteria
Oil and grease	No established criteria	78–114
Nutrients	20	90–110
Total Kjeldahl nitrogen (TKN)	20	80–120
Nitrate plus nitrite	20	90–110
Phosphorus, dissolved	20	90–110
Phosphorus, total	20	90–110
Total ammonia plus organic nitrogen	20	75.5–104
Metals	No established criteria	85–115
Hardness	20	75-125

[a] For Aroclor 1260

Appendix A

Standard Operating Procedures

DBS&A
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Standard Operating Procedure
Stream Water Sample Collection Using a Bucket

1. Purpose and Scope

This standard operating procedure (SOP) describes the method for collecting surface water samples from a stream using a bucket. The SOP applies to general water quality, metals, nutrients, and bacteria sampling programs. If per- and polyfluoroalkyl substances (PFAS) are included in the sampling program, this SOP must be revised to incorporate additional procedures and contamination control measures to ensure proper sample collection and data integrity.

This SOP was developed in accordance with established federal and state guidance documents to ensure consistency with recognized field methods and data quality standards.

2. Responsibilities

Field sampling must be conducted by trained personnel familiar with the project's quality assurance project plan (QAPP) and any applicable monitoring permits or protocols. Team members are responsible for following this SOP, maintaining clean sampling conditions, and ensuring the integrity of collected samples.

3. Equipment and Materials

3.1 Equipment Requisition and Preparation

Prior to any water sampling event, the designated water sampler shall ensure that all required equipment and supplies are properly requisitioned, organized, and available for use. A complete list of equipment and materials is provided in Table 1. Field personnel are responsible for verifying that all items are clean, functional, and appropriate for the intended sampling activities.

3.2 Sampling Equipment

Equipment is listed in Table 1. Field personnel shall use a clean plastic or stainless-steel bucket dedicated exclusively to surface water sampling. The bucket shall be equipped with a sturdy handle or rope to allow safe and controlled lowering into, and retrieval from, the waterbody. Buckets shall be clearly labeled and stored to prevent contamination between sampling events.

3.3 Equipment Calibration and Testing

All field equipment, with the exception of rental instruments, shall be inspected, calibrated, and tested prior to deployment. Calibration shall be conducted in accordance with the manufacturer's recommended procedures using clean, fresh calibration standards or reagents. All calibration and testing activities shall be documented in the field logbook or calibration record prior to sampling.

3.4 Decontamination Procedures

Proper decontamination of sampling equipment is essential to prevent cross-contamination between sampling locations and to ensure the integrity of analytical results. All equipment that comes into direct contact with the sample (e.g., buckets, bottles, tubing, or other collection devices) shall be cleaned and rinsed according to the procedures below.

3.4.1 General Equipment Decontamination

1. Initial Rinse: Rinse the equipment thoroughly with site water to remove sediment and debris.
2. Detergent Wash: Wash all contact surfaces with a non-phosphate, laboratory-grade detergent solution (e.g., Alconox®) using a clean brush or sponge.
3. Tap Water Rinse: Rinse thoroughly with tap water to remove all detergent residue.
4. Deionized (DI) Water Rinse: Rinse the equipment with DI or distilled water to eliminate any remaining contaminants.

3.4.2 Field Decontamination Between Sampling Sites

- Between sampling locations, repeat Steps 1–4 in Section 3.4.1 using field supplies (e.g., DI water and detergent solution) to minimize cross-contamination.

- Allow equipment to air dry in a clean, protected area or cover with clean aluminum foil or plastic sheeting if immediate reuse is necessary.

3.4.3 PFAS Considerations

If sampling for PFAS is anticipated, specialized decontamination procedures must be implemented. PFAS sampling requires strict avoidance of fluoropolymer-containing materials (e.g., Teflon®) and specific cleaning methods to prevent trace contamination. A separate PFAS-specific SOP or addendum shall be developed and followed for such sampling events.

3.5 Sample Containers

Table 2 summarizes the appropriate sample containers, preservatives, and holding times for the analytical parameters included in this program. All water samples shall be collected in new, unused containers supplied by the accredited analytical laboratory designated for analysis.

Do not rinse sample containers with distilled water, site water, or any other liquid prior to sample collection. Containers provided by the laboratory are pre-cleaned and, when applicable, pre-preserved to meet analytical requirements.

Pre-acidified sample containers shall be stored in secondary containment (e.g., coolers or plastic bins) with lids propped open to minimize vapor buildup. These containers should never be opened in an enclosed space or near the sampler's face.

When filling sample containers, avoid overfilling, as this may result in the loss or dilution of preservatives. Ensure that caps are securely tightened after filling, and that each container is properly labeled in accordance with the chain-of-custody and labeling procedures.

4. Safety Precautions

Before sampling, the field team should assess the site for hazards such as swift water, unstable banks, or contamination. Personnel must wear appropriate personal protective equipment, including gloves, waterproof boots, and a personal flotation device when working near deep or moving water. No one should enter the stream if conditions appear unsafe; in such cases, the sample should be collected from the bank using the bucket and rope.

5. Sampling Procedures

5.1 Site Preparation

Upon arrival at the sampling location, the sampler should approach the stream from downstream to avoid disturbing sediments. The date, time, site identification, weather, and water appearance should be recorded on the field documentation. Flow conditions and any visible discharges or disturbances should also be noted.

5.2 Equipment Decontamination

Before the first use of the day, the bucket should be rinsed three times with DI water. Between different sampling sites, the bucket must be washed with a phosphate-free detergent, rinsed with DI water, and allowed to air dry. The sampler should avoid touching the inside of the bucket or the mouths of sample bottles to prevent contamination.

5.3 Sample Collection

To collect the aliquot sample, the bucket is lowered on a rope into the flow facing upstream and submerged to approximately mid-depth. Care should be taken to avoid surface scum and bottom sediments. Avoid contaminating the sample with debris from the rope and bridge, or other sampling platform. For each aliquot, use the first bucketful of water to rinse the bucket. Use the second and third buckets of water to collect the sample.

Grab samples should be collected by collecting four separate sub-samples (aliquots), spaced 15 minutes apart, on any part of the hydrograph (first flush, rising limb, peak flow, falling limb). To composite the sample, the four aliquots are combined into a clean container and mixed. The sample is then decanted into sample containers obtained from the analytical laboratory.

Ensure that no air is entrapped in the sample vials to be analyzed for VOCs. Collect the sample by holding the vial at an angle so that aeration is minimized. Avoid touching the lip of the vial or the Teflon liner. If the sample cannot be collected directly from the water source, use a clean stainless steel cup. Direct the water stream against the inside surface of the vial. Allow a convex meniscus to form across the mouth of the filled vial. Carefully cap the vial, and then invert and tap the vial to ensure that no entrapped air is present. If entrapped air is present, recollect the sample.

Pre-preserved bottles must not be rinsed before filling. Each bottle should be filled to the required volume, capped securely, and labeled immediately with the site ID, date, time, sampler initials, and requested analyses.

5.4 Field Measurements

Immediately after collection, the sampler should measure field parameters such as temperature, pH, conductivity, chlorine, and dissolved oxygen using properly calibrated instruments. Fill a clean beaker or other appropriate container with surface water for field parameter measurement. The time of calibration, calibration standards, and instrument readings should all be documented on the field sheet.

5.5 Quality Control

The QAPP should be reviewed prior to any water sampling event. The QAPP 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.

To ensure data quality, field duplicates should be collected and equipment blanks should be prepared using DI water to check for potential contamination. All quality control samples must be clearly identified in the field records and on the chain-of-custody form.

5.6 Sample Handling and Preservation

After collection, samples should be stored in a cooler. Ensure that all samples required to be kept cool are surrounded and in contact with enough ice to cool to approximately 4°C. Ensure that sample bottles are not allowed to freeze during cooling, as freezing may compromise sample integrity. Make sure that all glass sampling containers are placed in bubble-wrap sleeves to protect from breaking. Bubble wrap may insulate samples from cooling and it may be necessary to place additional ice in coolers. Check to see that samples are adequately labeled and that container lids are secure.

If required, samples that are sensitive to light, such as nutrient samples, should be protected from sunlight. All samples must be transported to the analytical laboratory within the designated holding times. The chain-of-custody form must be completed, signed, and secured within the cooler.

5.7 Post-Sampling Decontamination

At the end of sampling or between sites, the bucket and all sampling tools should be washed with detergent and rinsed thoroughly with DI water. Equipment should then be air dried and stored in clean plastic bags to prevent contamination.

6. Documentation

All field observations, measurements, and deviations from this procedure must be recorded in the field notebook or data sheet. Chain-of-custody forms should be completed for every batch of samples, and any field issues or corrective actions must be documented. An example field sampling data sheet is provided as Attachment 1.

References

New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB). 2019. *Standard operating procedures for surface water sampling*.

NMED. 2021. *Quality assurance guidance for surface water monitoring programs*.

U.S. Environmental Protection Agency (EPA). 2023. *National field manual for the collection of water-quality data*. Techniques of Water-Resources Investigations, Book 9.

U.S. EPA. 2026. New Mexico Municipal Separate Storm Sewer System (MS4) Permit. NPDES Permit No. NMR04B000.

U.S. Geological Survey (USGS). 2018. *Field manual for the collection of surface water samples*.

Tables

Table 1. Sampling Equipment

Category	Item/Description	Purpose	Example/Specification
Sampling Containers	Pre-cleaned sample bottles (plastic, glass, etc.)	Collect and preserve surface water samples	As specified by analytical laboratory
Sampling Device	Clean plastic or stainless-steel sample collection bucket	Used to collect surface water aliquots from the stream	Dedicated to sampling only
Sample Collection	Clean 5-gallon plastic or stainless-steel sample composite bucket	Used to composite surface water from collected aliquots	Dedicated to composite only
Field Meters	Multi-parameter water quality meter (pH, DO, conductivity, temperature),	Measure in-situ field parameters	Calibrated per manufacturer's instructions
Calibration Supplies	Calibration standards and reagents	Used for meter calibration prior to sampling	pH buffers, conductivity standards, etc.
Field QA/QC Supplies	Field blanks, equipment blanks, deionized water	Quality control verification of sampling procedures	As specified in QAPP
Personal Protective Equipment (PPE)	Gloves, safety glasses, waders, life vest	Protect personnel and ensure safe sampling	Appropriate for site conditions
Labeling and Documentation	Waterproof labels, markers, field logbook	Proper labeling and field recordkeeping	Permanent ink, indelible labels
Decontamination Supplies	Laboratory-grade detergent, DI water, rinse bottles	Clean and rinse equipment between samples	Alconox® or equivalent
Miscellaneous Supplies	Cooler with ice or ice packs, chain-of-custody forms	Maintain sample integrity during transport	As required

Table 2. Sample Handling

Sample Type	Sample Container	Processing, Preservation, and Storage	Maximum Holding Time
Inorganics			
TSS/TDS/ions/alkalinity	1-quart polyethylene cubitainer or 250-mL HDPE bottle if sample is only for TSS/TDS	On ice, approximately 6°C	7 days if TSS included in analysis; otherwise 14 days.
Total nutrients	1-quart polyethylene cubitainer	2.0 mL concentrated sulfuric acid, on ice, approximately 6°C	28 days
Microbiological Tests			
Coliform: total, fecal, and E. coli	100-mL low density polyethylene vessel	0.0008% $Na_2S_2O_3$, on ice, approximately 10°C	6 hours
Metals			
Total metals	1-quart polyethylene cubitainer	5.0 mL concentrated nitric acid	28 days
Total recoverable aluminum	1-quart polyethylene cubitainer	Filter (10 µm) within 15 min of sample collection; 5.0 mL concentrated nitric acid.	6 months
Dissolved metals/hardness	1-quart polyethylene cubitainer	Filter (0.45 µm) within 15 min; 5.0 mL concentrated nitric acid	28 days if mercury included in analysis; otherwise 6 months

Attachment 1

Field Sheet

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Samplers_____

Sampling Data Sheet

Site Identification:

Sample Date and Time:
Sample Identification:

QC Samples: Duplicate / None
QC samples require a DIFFERENT sample time than the environmental sample. QC Sample Time: QC Sample ID:

Collection Point: **Collection Equipment:**

Total Sample Volume: Collection Time Start: End:

Water Quality Meter ID:
Calibration Date:

Field Parameters

Time	Temp (°C)	pH	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	ORP (mV)	Volume (Gallons)
Composite							

Standard Operating Procedure
Data Verification and Validation

1. Purpose and Scope

This standard operating procedure (SOP) describe activities associated with the validation and verification of water quality data. All data processed and received by the County will be verified and validated according to these procedures. All data not meeting the appropriate quality assurance/quality control (QA/QC) requirements as identified through the data verification and validation process are assigned appropriate laboratory qualifier or validation codes. A summary of validation codes is provided in Table 1. Field quality control criteria are listed in Table 2.

2. Responsibilities

The Project Coordinator will provide oversight to personnel and contractors that conduct or oversee the collection, handling, analysis, and use of water quality data. The Project Coordinator is responsible for ensuring that the data verification and validation process is completed in accordance with the specifications outlined in this document. The verification and validation process should be completed by a different person than entered the data into the spreadsheet. The Project Coordinator will resolve data quality issues. All information pertaining to this process, including the original data verification and validation worksheets, will be documented and maintained in the project files.

3. Background and Precautions

These procedures are based on EPA guidance for environmental data verification and validation (U.S. EPA, 2008). All field and laboratory data will be verified and validated for completeness, correctness, and conformance against specified methods and MS4 permit requirements. This process establishes the criteria for accepting, rejecting, or qualifying data. The data verification and validation worksheets serve as the summary of results for each type of data verified and validated.

Note: No data should be changed, altered, or deleted in any manner through the verification and validation process without proper documentation. Any changes should be indicated with appropriate notations on the worksheet.

4. Step-by-Step Process Description

4.1 General Guidance for All Data

The results of the data verification and validation processes should be tracked and documented on the water quality data verification and validation worksheet (Attachment 1). Data verification should be done as soon as possible following the data collection event or receipt of the data. When verifying a subset of data, the verifier should indicate data that have been verified to date for tracking purposes. To reduce spreadsheet errors, this process should be completed as soon after the entry of the data as possible.

The data validation process is typically completed after all data have been received and verified for a particular project or for a specific defined subset of the data, such as one sampling run; however, to accommodate data requests or to conduct preliminary data analyses, the validation can be performed at any point during the course of the project.

Supporting documents that may be needed for the data verification and validation process include the following:

- Copy of the FSP (sample locations, parameters, and frequencies),
- Field notebooks
- Sample collection chain of custody or equivalent records
- Data packages received from the laboratory
- Equipment/calibration logs (recorded in field notebook)

4.2 Chemical Data Verification and Validation

Chemical data verification should begin as soon as possible. Ideally, step 1 occurs immediately after the data for a sampling event have been entered into the spreadsheet. Other steps should be done as soon as possible after receipt of a complete set of data from the laboratory. Prior to the verification and validation process, the Project Coordinator will be responsible for verifying that laboratory reported values are consistent with established detection and non-detection

reporting protocols. Incorrectly reported or anomalous values are addressed with the laboratory and corrected prior to spreadsheet upload and the verification and validation process.

Step 1. Verify Field Data

Check to confirm that all field notes are accounted for in the field notebook and that they are complete and legible. Refer to sampling plan to determine what should have been recorded. Indicate missing and illegible information on the water quality sample data verification and validation worksheet (Attachment 1) and corrective actions taken.

Confirm that all data (e.g., location, date/time, RIDs, and field parameters) in field books have been correctly entered into the spreadsheet. If data have not been entered, complete data entry before continuing verification. The following information should be confirmed and entered:

- Sample location (station ID)
- Field staff
- Sample date and time
- Activity type (routine sample, QA sample, wet weather sample, dry weather sample)
- Media subdivision (e.g., surface water, sediment)
- Flow conditions (hydrograph data or flow estimates used for flow-proportional compositing)
- Any other field notes or comments on field forms

Step 2. Verify Data Deliverables (analytical results received from the laboratory)

Check to confirm that all data deliverables are complete and that the results consist of the correct analytes. Identify missing or misplaced results. This task should be completed as soon as possible after a complete set of data is received.

Review all chain of custody sheets (COCs) submitted to the laboratory and determine what results are expected to be received from the laboratory. Identify COCs for which laboratory data have not been received or for which there are incomplete or incorrect analytes. Contact data source (laboratory) to obtain missing results or identify why no results are available for a particular COC.

The purpose of this verification step is to identify samples that were analyzed or entered incorrectly so that the data can be rejected, corrected, or otherwise flagged to address issues associated with incorrect analysis. Note and flag for future reference any samples that were incorrectly analyzed on the water quality sample data verification and validation worksheet, indicating if it was a submittal request error, correct data associated with the incorrect suite, or laboratory analysis error. Include any appropriate validation codes (refer to Attachment 1 for complete list of validation codes) and load into the spreadsheet.

Step 3. Verify Flow Data

Confirm that the results of all flow measurements were correctly transcribed from the field sheet to the spreadsheet. Confirm that the results of all flow calculations have been entered into the spreadsheet.

Step 4. Verify Analytical Results for Missing Information or Questionable Results

Review laboratory reports for missing information, such as results, detection limits, or analytical method reference. Note any missing information (highlight on report and attach to worksheet). Contact data source (laboratory) to resolve issue and describe action taken on worksheet.

Look for questionable results and extreme outliers. Questionable results must not be changed without written approval and associated documentation, although corrections can be made to metadata (sample detection limits, units, etc.) with approval from the laboratory as appropriate. Upon receipt of any missing information, add missing information as well as any validation codes to spreadsheet and send to the Project Coordinator or upload to spreadsheet, specifically identifying what information needs to be added or corrected.

Step 5. Validate Blank Results

An analysis of blank results is conducted to identify potential contamination during field processing or transport.

Examine results and identify samples where chemical parameters were detected in the blanks at a concentration equal to or greater than the SDL. Refer to Table 3 for blank validation codes.

It is usually important and necessary to consult the analytical laboratory to examine the possible causes of blank contamination. When blanks demonstrate that contamination has occurred, the County must consider on a case-by-case basis if the contamination is significant enough to

reject the data and flag as "RB1" or simply flag the data "B1". When deciding whether the data need to be rejected, the Project Coordinator should consider the following:

- If the objective is to detect minute changes in variable concentrations, then even small levels of contamination reduce the ability to interpret the data with confidence.
- In the case where the contamination values approach the real data values, the data collected during the particular sample trip may be invalid.
- If the purpose of the study is to monitor for large variations, then small levels of contamination are not significant. In this case, a correction of the data can be made (subtract blank data values from the sample data values to get the reported value).

In a given sample run, flagging is limited to the period from the last compliant sample up to the first compliant sample. When multiple blank QC samples are collected, ALL data collected since the last compliant QC sample and all data up to the next compliant QC sample are assigned validation codes. If the non-compliant event is not preceded and followed by a compliant event within that sampling run, the qualified data range would include the entire sample run. This validation code will alert the data user that the results are outside QA control limits and may require resampling or a separate qualitative analysis based on professional judgment.

Step 6. Validate Holding Time Violations

Identify any data with a laboratory qualifier code of "K" or "Q" in the QUALIFIER_CODE column. The data validator should evaluate the impact of the holding time non-compliance, taking the following into account:

- The nature of the analysis (Was it a critical parameter in the determination of project objectives?)
- The nature of the analyte (Some analytes may be particularly sensitive to holding time violations or sample container issues.)
- The extent of the non-compliance (Was holding time missed by 1 day or 1 week? Is the regulatory limit 48 hours or 40 days?)
- The sample matrix, any supporting data (Was there a diluted analysis performed within holding times?), and the purpose and goals of the sampling and analysis program

the County and its contractor will, using best professional judgment, assign a validation code of "J1" or "R3" to these data to indicate that the result is estimated or that the result is rejected due to an extreme holding time violation, respectively.

Save any results, with appropriate validation codes, as an Excel file. Upload into the spreadsheet and, once completed, verify that these codes have been correctly added.

Step 7. Validate Replicate/Duplicate Results (if applicable)

The evaluation of field replicate/duplicate samples provides information on the environmental variability at a particular location, the sampling technique, sample processing and transport, and laboratory analysis.

The chemical data validation process includes an evaluation of the variability of measurements based on the relative percent difference (RPD) between field replicate and/or duplicate samples.

RPD between results for all replicate and duplicate pairs is calculated using the following equation:

$$RPD = \frac{|A - B|}{(A + B)/2} \times 100\%$$

where A = First duplicate concentration
B = Second duplicate concentration

If both reported values are <4 times the SDL, the RPD is not applicable and no entry is made.

If one or both of the reported values are ≥ 4 times the SDL and if the RPD ≥ 20%, a qualifier (PD1) is entered.

The data validator should evaluate the impact of RPDs ≥ 20%, taking into account the considerations listed in Step 5.

When multiple QC samples are collected, ALL data collected since the last compliant QC sample and all data up to the next compliant QC sample are assigned validation codes. If the non-compliant event is not preceded and followed by a compliant event, the qualified data range would include the beginning or end of the sample run. Flagging is limited to the non-compliant analytes and to the sample run in which the non-compliant sample was identified. This

validation code will alert the data user that the results are outside control limits and may require resampling or a separate qualitative analysis based on professional judgment.

4.3 Completion of Chemical Data Verification and Validation Process

When all data verification and validation steps have been completed, sign the completed water quality sample data verification and validation worksheet.

Notify the Project Coordinator that the verification and validation process has been completed for that particular study.

References

New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB). 2024. *Quality assurance project plan for water quality management programs*.

U.S. Environmental Protection Agency (U.S. EPA). 1994. *NPDES compliance inspection manual*. EPA/300/B-94/014. September 1994.

Tables

Table 1. Definitions for Standard Data Qualifiers

Qualifier	Definition
U	The analyte was analyzed for, but was not detected at a level greater than or equal to the reported sample quantitation limit.
J	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
J-	The result is an estimated quantity, but the result may be biased low.
J+	The result is an estimated quantity, but the result may be biased high.
UJ	The analyte was not detected at a level greater than or equal to the adjusted RL. However, the reported adjusted RL is approximate and may be inaccurate or imprecise.
R	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
B	The analyte is found in the sample and the associated blank. It indicates possible/probable blank contamination and warns the data user to take appropriate action
E	Analyte concentration exceeds the calibration range of the High-resolution Gas Chromatograph/Mass Spectrometer (HRGC/HRMS) instrument for that specific analysis. All compounds with a response greater than full scale should have the concentration flagged "E" on the Form I for the original analysis. If the dilution causes any compounds identified in the first analysis to be below the calibration range in the second analysis, the results of both analyses shall be reported on separate copies of Form I. The Form I for the diluted sample shall have the "DL" suffix appended to the EPA Sample Number.
D	All compounds identified in an analysis at a secondary dilution factor. If a smaller sample size is analyzed, as in the "E" flag above, the "DL" suffix is appended to the EPA Sample Number on the Form I for the diluted sample, and all concentration values reported on that Form I are flagged with the "D" flag. This flag alerts data users that any discrepancies between the concentrations reported may be due to dilution of the sample extract.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
C	This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by GC/MS.
X	This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.

Table 2. Field Quality Control Summary

Data Type	QC Check	QC Criteria	Action for Data Not Meeting QC Requirements	Information Provided	QC Frequency
Chemical data	Equipment blank for dissolved metals	Parameter detected at concentration ≥ SDL	Flag data appropriately; determine source of contamination and implement corrective action	Sample collection, transportation and/or handling bias	1 per year
	Equipment blank for per- and polyfluoroalkyl substance (PFAS)	Parameter detected at concentration ≥ SDL	Flag data appropriately; determine source of contamination and implement corrective action	Sample collection, transportation and/or handling bias	1 per sample
	Trip blank for VOCs	Parameter detected at concentration ≥ SDL	Flag data appropriately; determine source of contamination and implement corrective action	Sample collection, transportation and/or handling bias	1 per sample
	Duplicates	RPD between samples greater than analytical uncertainty	Determine possible cause (variability in environmental conditions, improper sampling technique, lack of training, etc.); flag data if appropriate and implement corrective action	Performance characteristics for sampling protocols; environmental variability	1 per year

QC = Quality control
VOCs = Volatile organic compounds
RPD = Relative percent difference

Table 3. Blank Validation Codes

Concentration in Blank	Monitoring Type	
	I	II
< SDL	No Code	No Code
≥ 5% of Sample Concentration	RB1	RB1
≥ SDL and <5% of Sample Concentration	B1	RB1
≥ SDL and Sample Concentration <SDL	B1	RB1

I = Ambient/assessment and effectiveness monitoring
II = NPDES compliance evaluation and WQS enforcement monitoring

Attachment 1

Data Verification and Validation Worksheet

DBS&A
a Geo-Logic Company

Attachment 1.1 Water Quality Sample Data Verification and Validation Worksheet

Study Name: _____
Year:____
Project Coordinator:_____
Data covered by this worksheet:_____
Version of Verification/Validation Procedures: _____QAPP

Step 1: Verify Field Data

A. Are all Field Data forms present and complete? ☐ Yes ☐ No

If yes, proceed; if no, attempt to locate missing forms, then indicate any remaining missing forms and action taken.

Missing Field Data Forms	Action Taken
_____	_____
_____	_____

Total number of occurrences: _____

B. Are station name and ID, and sampling date and time on forms consistent with database? ☐ Yes ☐ No
If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify.

Station and Parameter	Action Taken	Re-verified?
_____	_____	_____
_____	_____	_____

Total number of occurrences: _____

C. Are field data on forms consistent with database? ☐ Yes ☐ No
If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify.

Station	Sampling Date	Parameter(s) Corrected	Re-verified?
_____	_____	_____	_____
_____	_____	_____	_____

Total number of occurrences: _____

D. Are RIDs correct and associated with the correct analytical suite, media subdivision (e.g. surface water, municipal waste, etc.) and activity type (e.g. Field observation, Routine sample, QA sample etc.)?
☐ Yes ☐ No

If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify

Station/RID	Sampling Date	RID Corrected	Re-verified?
_____	_____	_____	_____
_____	_____	_____	_____

Total number of occurrences: _____

☐ **Step 1 Completed** ***Initials:*** _____ ***Date:*** _____

- -

Step 2: Verify Data Deliverables

A. Have all data in question been delivered? ☐ Yes ☐ No

If yes, proceed; if no, indicate RIDs with missing data (samples or blanks) or attach report with applicable RIDs highlighted. Contact data source and indicate action taken. Complete this step upon receipt of all missing data.

RID	Submittal Date	Missing Data/Parameters	Date of Initial Verification	Date Missing Data Were Received
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Total number of occurrences: _____

B. Do all of the analytical suites have the correct number and type of analytes. ☐ Yes ☐ No

If yes, proceed; if no, indicate RIDs with missing or incorrect analyte(s) or attach report with applicable RIDs highlighted. Contact data source and indicate action taken.

RID	Submittal Date	Missing or Incorrect Parameters	Action Taken	Re-verified?
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

☐ **Step 2 Completed** ***Initials:*** _____ ***Date:*** _____

- -

Step 3: Verify Flow Data

A._Identify incorrect or missing data on the flow calculation spreadsheet and correct errors.

Station	Sampling Date	Flow data missing or incorrect?
______	______	_________
______	______	_________

Total number of occurrences: _____

B. Identify incorrect or missing discharge measurements, correct errors in database and re-verify.

Station	Sampling Date	Flow data missing or incorrect?	Re-verified?
______	______	_________	_________
______	______	_________	_________

Total number of occurrences: _____

☐ **Step 3 Completed** ***Initials:* _____** ***Date:* _____**

Step 4: Verify Analytical Results for Missing Information or Questionable Results

Were any results with missing/questionable information identified? ☐ Yes ☐ No

If no, proceed; if yes, indicate results with missing information or questionable results or attach report. Contact data source and indicate action taken. Complete this step upon receipt of missing information or clarification of questionable results (clarify questionable results only, DO NOT change results without written approval (from lab or QA officer) and associated documentation).

RID	Sample Date	Missing or Questionable Information/Results	Action Taken
______	______	______	______
______	______	______	______

Total number of occurrences: _____

☐ **Step 4 Completed** ***Initials:* _____** ***Date:* _____**

Step 5: Validate Blanks Results
Were any analytes of concern detected in blank samples? ☐ Yes ☐ No

If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager, with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes have been added to database correctly.

RID	Sample Date	Parameter	[Blank]	[Sample]	Validation Code/Flag Applied	Code/Flag verified in database? *
_____	______	______	______	______		_________
______	______	______	______	______		_________

*See validation procedures to determine which associated data need to be flagged and include on *Validation Codes Form*.

Total number of occurrences: _____

☐ **Step 5 Completed** ***Initials:*** _____ ***Date:*** _____

- -

Step 6: Validate Holding Times Violations
Were any samples submitted that did not meet specified holding times? ☐ Yes ☐ No

If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes/flags have been added to database.

RID	Sample Date	Parameter	[Blank]	[Sample]	Validation Code/Flag Applied	Code/Flag verified in database to ALL associated data?*
______	______	______	______	______		_________
______	______	______	______	______		_________

*See validation procedures to determine which associated data need to be flagged.
Total number of occurrences: _____

☐ **Step 6 Completed** ***Initials:*** _____ ***Date:*** _____

- -

Step 7: Validate Replicate/Duplicate Results (if applicable)
Were any replicate/duplicate pairs submitted outside of the established control limit of 20%?
☐ Yes ☐ No

If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes/flags have been added to database.

RID Pairs		Replicate or Duplicate?	Sample Date	Parameter	RPD	Validation Code/Flag Applied	Code/Flag verified in database applied?*
_____	_____	_____	_____	_____	_____		_____
_____	_____	_____	_____	_____	_____		_____

*See validation procedures to determine which associated data need to be flagged.

Total number of occurrences: _____

☐ **Step 7 Completed** ***Initials:*** _____ ***Date:*** _____

****

After all of the above steps have been completed, save and print the worksheet, attach all applicable supplemental information and sign below.

I acknowledge that the data verification and validation process has been completed for the data identified above in accordance with the procedures described in the SWQB QAPP.

_____

Data Verifier/Validator Signature Date

COMPLETION OF DATA VERIFICATION AND VALIDATION PROCESS

Once the data verification and validation process has been completed for the entire study (note: if the worksheet is for a subset of the data from a study, be sure ALL the data for the entire study is included before final completion of the data verification and validation process), notify the NMSQUID administrator that the process is complete and request that “V V in STORET” be added to the project title.

Once all data have been verified and validated for a study provide copies of ALL *Data Verification and Validation Worksheets* and attachments associated with the study to the Quality Assurance Officer and retain originals in the project binder.

Attachment 1.2 SWQB Validation Codes

When deficiencies are identified through the data verification and validation process, the CAC documents or “flags” the deficiencies by assigning validation codes. All data collected from the last compliant QC sample and up to the next compliant QC sample are assigned validation codes.
The validation code alerts the data user that the results are outside QA control limits and may require resampling or a separate, qualitative analysis based on professional judgment.

Validation Code	Definition	WQX Equivalent
A1	Sample not collected according to SOP	
B1	Chemical was detected in the field blank at a concentration less than 5% of the sample concentration.	
BN	Blanks NOT collected during sampling run	
BU	Detection in blank. Analyte was not detected in this sample above the method's sample detection limit.	BU
RB1	Chemical was detected in the field blank at a concentration greater than or equal to 5% of the sample concentration. Results for this sample are rejected because they may be the result of contamination; the results may not be reported or used for regulatory compliance purposes.	B
R1	Rejected due to incorrect sample preservation	R
R2	Rejected due to equipment failure in the field	R
R3	Rejected based on best professional judgment	R
D1	Spike recovery not within method acceptance limits	
F1	Sample filter time exceeded	
J1	Estimated: the analyte was positively identified and the associated value is an approximate concentration of the analyte in the sample	J
K1	Holding time violation	H
Ea	Estimated-Incubation temperature between 35.5 and 38.0° Celsius	
Er	Rejected-Incubation temperature < 34.5 or >38.0° Celsius	
PD1	Percent difference between duplicate samples excessive	
S1	Per SLD, uncertainties (sigmas) are expressed as one standard deviation, i.e. one standard error. Small negative or positive values that are less than two standard deviations should be interpreted as “less than the detection limit.”	
S2	Data are suspect but deemed usable based on best professional judgment; documentation of justification is required and should be included in the Data Verification and Validation Packet and reported with results	
Z1	Macroinvertebrate data did not meet QC criteria specified in Section 2.5 of QAPP	
H1	Habitat data did not meet QC criteria specified in Section 2.5 of QAPP	