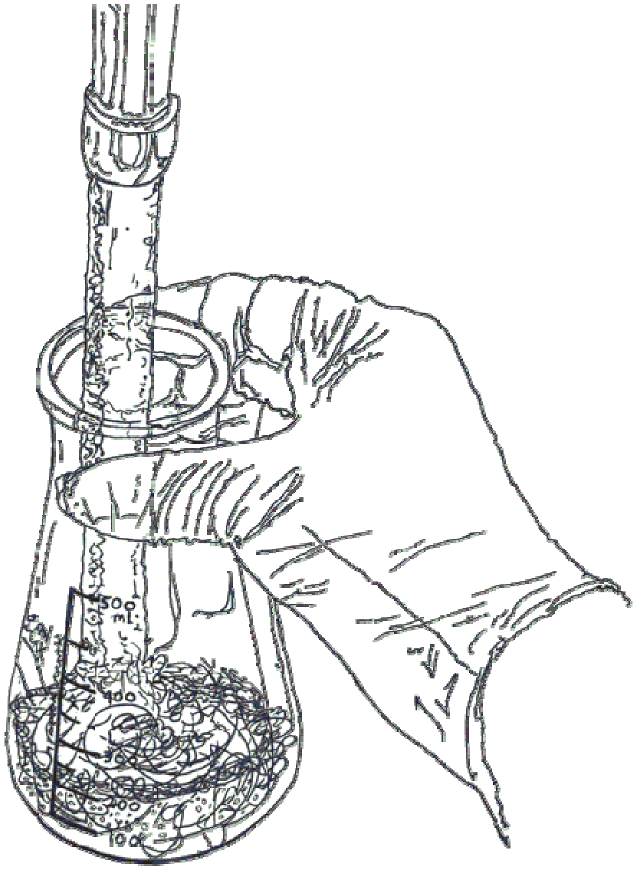
New Mexico
Water Sampling
Certification Study Guide



Utility Operator Certification Program
NMED Surface Water Quality Bureau
PO Box 5469
Santa Fe, NM 87502
www.nmenv.state.nm.us/swqb/fostop.html

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NEW MEXICO

WATER SAMPLING TECHNICIAN

CERTIFICATION STUDY GUIDE

Version II
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ACKNOWLEDGEMENTS

This "WATER SAMPLING TECHNICIAN CERTIFICATION STUDY GUIDE" has been created as a tool to assist those who collect water system samples in preparation for taking Water Sampling Technician certification exams. This book is not intended to be a complete reference manual for technical information. Its purpose is to guide the reader to study material for each of the major subject areas for Level 1 and Level 2 certification. There is no implied claim that this study guide covers every possible point on which a technician may be tested. However, it is intended to be comprehensive in its coverage of the essential information for each exam, based on standard Need-To-Know criteria.

This study guide is divided into seven chapters. Each chapter in the study guide has study questions and sample test questions that are intended help the individual focus on the type of information that is covered in an exam. The study questions are designed to direct the reader to exam information that is related to the chapter topics. No answer sheet is provided. You will have to look them up.

The Appendix contains helpful information regarding sampling schedules and the development of sample siting plans for the system.

The material dealing with sample collection has been referenced to approved EPA methodology for sample collection and preservation. Information regarding the completion of the various sample request forms has been referenced to the New Mexico Department of Health – Scientific Laboratory Division.

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NEW MEXICO ENVIRONMENT DEPARTMENT
SURFACE WATER QUALITY BUREAU
UTILITY OPERATORS CERTIFICATION PROGRAM

The New Mexico Water Quality Control Commission, through the New Mexico Environment Department (NMED), grants certification for competency to the operators of water and wastewater systems. The Utility Operators Certification Program (UOCP) conducts the testing for certification. Certain requirements must be met before an operator is eligible to take a certification examination.

An operator begins the process by completing a test application from the UOCP. Applications will only be accepted if they are submitted at least 30 days prior to the exam date. A certification officer will review each application to determine if the operator is eligible to take the requested examination. An application must be submitted every time a test is taken. Examinations are given several times a year at various locations around the state. A **fee** of **$25.00 or $30.00** (depending on level of certification) for **each** examination must be paid to **NMED Utility Operators Certification Program**. A check or money order for the proper amount **must** accompany each exam application.

Certificates must be renewed every three years. The renewal date will be the last day of the certificate holder's birthmonth following the third anniversary of the certificate. The UOCP also handles renewal of certificates. The **fee** for renewal is **$20.00, $25.00 or $30.00** (depending on level or certification) for **each** certificate.

The UOCP maintains training credits for certified operators only. Each operator must keep a record of all training credits earned. A record of current training credits is mailed to each certified operator yearly in July. Anyone who intends to apply for NM certification must include documentation of training credits when the application is submitted. Certified operators that are taking higher-level exams may also have to submit training credit documentation to update training record files at the UOCP.

All correspondence, including applications, should be mailed to:

NMED Surface Water Quality Bureau
Utility Operators Certification Program
PO Box 5469
Santa Fe, NM 87502

Please feel free to call the UOCP to request information on exam application forms, exam dates and locations, or certification and renewal. The telephone number for the office is **(505) 827-2804**.

IMPORTANT FACTS ABOUT OPERATOR CERTIFICATION

An operator, as defined by NM Water Quality Control Commission Regulations, is "any person employed by the owner as the person responsible for the operation of all or any portion of a water supply system or wastewater facility. Not included in this definition are such persons as directors of public works, city engineers, city managers, or other officials or persons whose duties do not include actual operation or direct supervision of water supply systems or wastewater facilities."

Under the Utility Operator Certification Act, "a certified operator is a person who is certified by the commission as being qualified to supervise or operate one of the classifications of water supply systems or wastewater facilities". Experience is "actual work experience, full or part-time, in the fields of public water supply or public wastewater treatment. Work experience in a related field may be accepted at the discretion of the commission". Any claim of related experience will be reviewed by the WQCC or its advisory body, the Utility Operators Certification Advisory Board.

The Advisory Board is an appointed "seven-member board from the certified water systems operators and wastewater facility operators to function with the commission to establish qualifications of operators, classify systems, adopt regulations and advise the administration of the Utility Operators Certification Act."

Experience that includes operation, maintenance or repair of water treatment and water distribution systems is accepted based on whether it is full or part-time. The Advisory Board will review and approve experience in other related fields, such as commercial plumbing or utility construction. Credit for part-time experience will be based on the percentage of time devoted to actual operation or maintenance. Full time water or wastewater laboratory experience may be counted as operator experience at a rate of 25% of actual experience. The credit for this experience will be determined by review of the Advisory Board.

BASIC CERTIFICATION REQUIREMENTS

There are three basic requirements an operator must meet to qualify for New Mexico certification. All certified operators must have at least **one year** of actual experience in operation or maintenance of a public water system. All levels of certification require **high school graduation or GED** (see substitutions.) All levels of certification require a certain number of **training credits** in water systems O&M or related fields.

BASIC CERTIFICATION REQUIREMENTS

	Experience	Training Credits	Education
Class 1/ Small Systems	1 year*	10	HS Grad or GED*
Class 2	2 years*	30	HS Grad or GED*
Class 3	4 years*	50	HS Grad or GED*
Class 4	1 year as Class 3	80	HS Grad or GED

* - See Substitutions

SUBSTITUTIONS

One year of additional experience may be substituted for the high school graduation or GED requirement for all classes **except** Class 4. Education may be substituted for experience or training credits in some cases. The education must be in a water or wastewater related field. One year of vocational education can be substituted for up to one year of experience. Associates and Bachelor's degrees in a related field may be substituted for up to three years of experience and 50 training credit hours, depending on the amount of actual experience. The criteria for substitution of education for experience are as follows:

> No more than one year (30 semester hours) of successfully completed college education in a **non-related field** may be substituted for an additional **six months** of the required experience.
>
> **One year** of approved vocational school in the water and/or wastewater field may be substituted for only **one additional year** of the required experience.
>
> An **associate's degree** for a two-year program in an approved school in the water and/or wastewater field and **six months** of actual experience in that field (which may be accrued before, during, or after the school program) may be substituted for the requirements of any level up to and including **Class 2**. An **associate's degree** for a two-year program in an approved school in the water and/or wastewater field and **twelve months** of actual experience in that field (which may be accrued before, during, or after the school program) may be substituted for the requirements of any level up to and including **Class 3**.
>
> Completion of at least **three year**s of actual experience in the water and/or wastewater field plus **high school graduation** or equivalent, plus **15 semester hours** of successfully completed college education directly related to the water or wastewater field may be substituted for any level up to and including **Class 3**.
>
> A **bachelor's degree** for a major directly related to the water or wastewater field plus **two years** of actual experience in that field may be substituted for any level up to and including **Class 3**.

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NEW MEXICO WATER SAMPLING TECHNICIAN CERTIFICATION STUDY GUIDE

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INTRODUCTION TO DRINKING WATER SAMPLING

The primary goal of the Safe Drinking Water Act (SDWA) is to make sure public water systems (PWS) treat the water to meet minimum water quality standards, designed to protect the public from unnecessary health risks. Public water systems (PWS) are responsible for cyclical sampling and analysis for contaminants that pose a known health risk. The results of these tests must be reported to both the public and the state regulatory agencies. The regulatory agency, or primacy agency, in New Mexico is the New Mexico Environment Department.

NEW MEXICO WATER SAMPLING TECHNICIAN CERTIFICATION

In 2006 the NMED created a mandatory certification program for those individuals responsible for the collection of these water quality samples. It is called the Water Sampling Technician (WST) certification program. The program is divided into two levels of certification. WST Level 1 certification covers the collection of water samples for microbiological analysis. WST Level 2 certification covers the microbiological sampling and sampling for the various chemical and radiological analyses. Each level of certification requires successful completion of a written certification examination. NMED and the NM Certification Advisory Board are responsible for preparing the exams for each level.

Water Systems Operator certification may be substituted for Water Sampling Technician certification. Level 1 Water System, Distribution System, or Small Water System operator certification may be used in place of WST Level 1 certification. A Level 2 (or higher) Water System or Distribution System, or Advanced Small Water System certification may be used in place of WST Level 2 certification.

There are prerequisite training requirements for each level of certification. The Water Sampling Technician Level 1 certification requires five (5) hours of training credits. Ten (10) hours of training credits are required to qualify for the Water Sampling Technician Level 2 certification. There are no experience requirements for WST certification.

NEW MEXICO WATER CONSERVATION FEE

In 1996, the New Mexico Water Conservation Fee was created to fund much of the sampling and testing required to meet SDWA monitoring requirements. A fee of 3 cents per 1000 gallons produced is collected from most public water systems in New Mexico. Tribal systems and systems on federal reservations (primarily military and forest service) are not included in the program. The Conservation Fee is used to fund sample collection (except for lead and copper sampling) and testing for primary inorganic, organic, and radiological contaminants in accordance with the 1986 SDWA monitoring requirements. The fee also covers routine microbiological testing, but not collection of the samples. The NMED Drinking Water Bureau is responsible for sample collection for routine chemical monitoring. These analyses are run by a number of certified labs across the state.

This means that the New Mexico public water systems (PWS) that are included in the program are only responsible for collection of monthly bacteriological samples and lead and copper samples in order to comply with SDWA monitoring schedules. However, the PWS is ultimately responsible for compliance and must maintain records showing that samples have been collected and analysis results are available, through documentation like the Consumer Confidence Reports, in accordance with the regulations.

ANALYSES THAT ARE COVERED BY THE FEE

The Water Conservation Fee covers sample collection and testing for most of the primary chemical contaminants as required by the 1986 SDWA revisions. Routine microbiological compliance testing is also covered.

The Water Conservation fee <u>does</u> <u>not</u> pay for:

- **Repeat microbiological sample analyses**
- **Special non-compliance microbiological samples like line breaks or raw water samples**
- **Lead and Copper sample collection**
- **Secondary contaminant sampling and testing**
- **Any discretionary chemical testing that is not required for monitoring compliance**
- **Sampling and testing for private systems**
- **Sampling and testing for Tribal or Federal water systems**

SAMPLE SITING PLANS

Compliance sampling will either occur at the point-of-entry (POE), within the distribution system, or at the point-of-use (POU) in the water system. Most chemical contaminant samples are taken at the point-of-entry to the system. This is a point where treated water enters the distribution system. Microbiological samples are taken from various locations in the distribution system. Disinfection by-products samples are also taken from the distribution system. Lead and copper samples are taken from point-of-use sites. These are locations where water is drawn directly from customers' plumbing fixtures. Even though microbiological samples are often taken from customers' taps, the samples are collected after the plumbing has been flushed with fresh water from the distribution system. They are not technically point-of-use samples.

Site sampling plans must be developed to make sure that samples are taken from the appropriate locations within the system. The plans should distribute locations in a way that insures representative coverage of the system. Most systems will only be involved in microbiological and lead and copper sampling site plans. They are the most detailed plans. Most systems have a limited number of points-of-entry that can be easily identified for the chemical analyses that require POE samples. There will normally be more microbiological sample sites than POE sites.

The sampling plan for microbiological samples may also require moving locations each month in order to properly cover the entire system over time. Some systems may find that they need to take more than the minimum number of samples each month to make sure the system is adequately covered. Detailed guidelines for establishing a sample siting plan are included in the Appendix.

COMPONENTS OF A SAMPLE SITING PLAN

There are four major components to a sample siting plan.

1) **Written Description of the System** – A written description of the system should include:
    - Type of source water/Treatment processes/Population served
    - System name/address/ID number/phone number
    - Owner's name/address/phone number
    - Operator's name/address/phone number
    - Months in operation – If seasonal (parks/recreational areas)
    - Lab used for analyses

2) **Distribution System Map** – The maps for POE sampling should identify the physical location of each POE to the distribution system. Treatment facilities, disinfection facilities, and storage tanks should also be identified on the map. Maps that are used for microbiological, lead and copper, or disinfection by-products sampling plans should identify sites by address and physical location. Small water systems with only one service are not required to submit a map as part of their plan.

3) **Plan Narrative** – The narrative should include specific information about the system and sampling point information. For microbiological sampling, it should also include a description of the sampling schedule and rotation between various sites that may be required to achieve representative coverage of the system. Each sampling site should sampled at least once every 4 months. Systems taking six or more samples a month, shall collect them at regular time intervals throughout the month

4) **Site Sampling Plan Maintenance** – The sampling plan should be updated as the system expands or conditions change that would dictate the addition of new sampling sites.

LEVEL 1 STUDY QUESTIONS

1. What are the three parts of a site sampling plan?
2. What are funds from the Water Conservation Fee used for?
3. What types of samples can Level 1 Water Sampling Technicians collect?

LEVEL 1 SAMPLE TEST QUESTIONS

1. How much is the Water Conservation Fee?

   A. $0.03/100 gallons
   B. $0.03/1000 gallons
   C. $0.50/1000 gallons

2. The Water Conservation Fee covers repeat microbiological sample analyses.

   A. True
   B. False

3. How many hours of training credits are required for WST Level 1 certification?

   A. 5
   B. 10
   C. 20
   D. 30

LEVEL 2 STUDY QUESTIONS

1. What information should be included in a sample siting plan narrative?
2. What is the difference between POE and POU sample sites?
3. Which samples must be collected by the PWS?

LEVEL 2 SAMPLE TEST QUESTIONS

1. What type of sample is a lead and copper sample?

   A. POE
   B. POU
   C. Distribution

2. The Water Conservation Fee covers secondary contaminant sample collection and analyses.

   A. True
   B. False

3. How many hours of training credits are required for WST Level 2 certification?

   A. 5
   B. 10
   C. 20
   D. 30

4. Systems that collect 6 or more microbiological samples a month must:

   A. Collect them at the first of the month.
   B. Collect them at regular time intervals.
   C. Collect them at the end of the month.

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SAFE DRINKING WATER ACT

The federal Safe Drinking Water Act (PL93-523) was enacted in 1974 and went into effect in 1976. The purpose of the Act is to establish national enforceable standards for drinking water quality and to guarantee that water suppliers monitor water to ensure that it meets national standards. This Act established either the maximum concentration of pollutants allowed in, or the minimum treatment required for, water that is delivered to the customers. These substances are known to present adverse health effects to humans. Prior to the passage of PL93-523 standards were set by the individual state regulatory agencies. The limits and enforcement procedures varied from state to state and, in passing the law, Congress has attempted to assure uniformly safe drinking water for the general public. The SDWA has been amended several times over the last 30 years.

The New Mexico Environment Department-Drinking Water Bureau is the enforcement agency for New Mexico. All source water sampling, except for tribal and federal systems, is handled through the NMED-DWB. Systems are responsible for collecting samples from the distribution system.

PUBLIC WATER SYSTEMS

The regulations established in PL93-523 apply only to public water systems. A *Public water system* or *PWS* means a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. A public water system is either a ‘‘community water system’’ or a ‘‘non-community water system.’’ *Non-community water system* means a public water system that is not a community water system. A non-community water system is either a ‘‘transient non-community water system (TWS)’’ or a ‘‘non-transient non-community water system (NTNCWS).’’*Transient non-community water system* means a non-community water system that does not regularly serve at least 25 of the same persons over six months per year. *Non-transient non-community water system* means a public water system that is not a community water system and that regularly serves at least 25 of the same persons over 6 months per year.

PRIMARY CONTAMINANTS

Certain substances and organisms in drinking water have been determined to cause adverse health effects. They are referred to as primary contaminants. These substances can be grouped into four major categories:

1) INORGANIC CONTAMINANTS
2) ORGANIC CONTAMINANTS
3) RADIOLOGICAL CONTAMINANTS
4) MICROBIOLOGICAL CONTAMINANTS

MAXIMUM CONTAMINANT LEVELS (MCL)

The maximum amount of any one of these substances that can be allowed in water, according to the regulations, is known as the maximum contaminant level (MCL). The MCLs for these chemicals and compounds are set at levels that are considered to be many times less than the concentrations that are known, or anticipated to cause adverse health effects.

INORGANIC CONTAMINANTS

These contaminants are mostly heavy metals. They may enter the water supply naturally through groundwater formations or from mining runoff and industrial discharges. The MCL for each chemical is listed below.

INORGANIC CONTAMINANT	MCL (mg/L)
Antimony	0.006
Arsenic	0.010
Barium	2
Beryllium	0.004
Cadmium	0.005
Chromium	0.1
Cyanide	0.2
Mercury	0.002
Selenium	0.05
Thallium	0.002
Copper	1.3* Action level
Lead	0.015* Action level
Nitrate (as N)	10
Total Nitrate/Nitrite (as N)	10
Nitrite (as N)	1
Fluoride	2.0 Secondary MCL 4.0 Violation
Turbidity	0.3 NTU in 95% of samples 1 NTU maximum
Asbestos	7,000,000 Fibers/L

LEAD AND COPPER RULE

A representative sampling survey must be conducted for lead and copper that may be present at the customer's tap. Most of the lead and copper found this way comes from the customer's plumbing. The system will be responsible for treating the water to stabilize the corrosive qualities that cause the leeching of lead and copper from the customer's plumbing. Sampling for lead and copper requires taking a “first draw” sample from the customer’s tap, after water has been standing in the plumbing for at least 6 hours but no longer than 18 hours. If the 90th percentile results exceed the action levels for either metal, the system must take steps to stabilize the system water through chemical addition of lime or another form of alkalinity.

NITRATE AND NITRITE

Nitrate and nitrite are the only chemical contaminants that represent an immediate health risk. Pregnant mothers and infants under 18 months can develop a condition known as “Blue Baby Syndrome”. The presence of nitrate in the bloodstream reduces oxygen uptake that gives the skin a blue tint.

FLUORIDE

Fluoride is added to water to help prevent tooth decay. The optimum dosage for fluoride is 0.8-1.2 mg/L. However, at higher concentrations, fluoride can create stains on teeth and lead to brittle bones in older individuals. The average ambient air temperature for the system is used to determine the optimum dosage for fluoride.

TURBIDITY

Turbidity is clay, silt or mud in the water. Although turbidity does not represent a health risk by itself, it can shield harmful bacteria from disinfection processes. Turbidity is measured in Nephelometric Turbidity Units (NTU). The device used to measure NTU’s is called a nephelometer or turbidimeter.

PH

The pH of the water is the measurement of the acidity or alkalinity of the water. Water is considered to be acid when it has more hydrogen ions (H^+) in it than hydroxide ions (OH^-). Some of the chemicals that add hydrogen ions (H^+) to the water are hydrochloric acid, HCl, sulfuric acid, H_2SO_4, nitric acid, HNO_3, and carbonic acid, $H_2\ CO_3$,

Water is considered to be alkaline when there are more hydroxide ions (OH^-) present than hydrogen (H^+) Sodium hydroxide, NaOH, calcium hydroxide, $Ca(OH)_2$, and magnesium hydroxide, $Mg(OH)_2$, all add hydroxide ions (OH^-) to the water. When the number of hydrogen ions and hydroxide ions are the same the water has a neutral pH. Pure water, H_20 or H-OH, has a neutral pH because the number of hydrogen ions (H^+) and hydroxide ions (OH^-) are equal.

pH SCALE

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
^
MORE ACID **NEUTRAL** **MORE ALKALINE**

The pH of water is measured on a scale that reads from 0 to 14. The midpoint of the scale is 7. Water with a pH of 7 is neutral. If the water has a pH less than 7, the water is acid and if the pH is greater than 7 it is alkaline. For every whole number that the pH changes the strength of the acid or alkaline properties of the water will change by a factor of ten times. Water that goes from a pH of 9 to a pH of 10 becomes 10 times more alkaline and water at pH of 5 is 10 times more acid than water at a pH of 6.

DISSOLVED OXYGEN

Dissolved oxygen is often measured to determine the oxygen level in potable and non-potable waters. The DO meter and electrode work in similar fashion to other electronic meters but unlike the others, this meter must be continually "on" to remain polarized. To be "on" the electrode must be continuously attached to the meter and the meter must be either plugged into an AC outlet or if battery operated, the battery must be good. If the battery fails, or the meter is unplugged, the DO electrode must be re polarized for an hour before being used to measure a sample.

Selecting a DO meter

ASK! There are a number of DO meter manufacturers and a lot of headaches associated with DO meters. Talk to a number of other laboratories to find out about membrane replacement, manufacturer support, ease of calibration, and reliability. Purchasing a $1000 meter, then finding out the manufacturer will not support the electrode after a few years is a tough pill to swallow. Are accessories for BOD measurement available, fragile, and expensive? When running the BOD test, how many parts will have to be cleaned between samples? Lots of parts will mean lots of potential sources of error.

Calibrating the DO meter

DO meters must be calibrated following the manufacturer's instructions. Since oxygen is a gas, it is influenced by the barometric pressure (altitude) and temperature. The manufacturer provides a table that can be used to determine the saturated DO level at different elevations and temperatures. Meters are commonly calibrated against a saturated air solution. The saturated air can be a saturated sponge in the storage sleeve (Orion) or in a BOD with about 1" of water (YSI).

Figure: Laboratory calibration of DO meter

It is a good idea to periodically validate the DO calibration using the Winkler Titration Method.

Membrane replacement

A functioning membrane is essential to good DO measurement. The membrane allows oxygen to permeate to the electrode where it creates a mill-volts current directly proportional to the DO concentration. One of the major advantages of the electrode method is that it can be used continuously. The DO electrode can be submerged in the stream to different depths or in an aeration basin and the DO monitored continuously. However, the membrane does not last indefinitely and must be changed frequently.

Figure: DO electrode, the membrane at the end of the probe requires periodic replacement.

Erratic calibrations or readings are usually indicative of either a bad membrane or bad battery. Maintaining a maintenance log will help the lab technician predict when failure is likely to occur. Replacing the membrane should only take a couple of minutes. Follow the manufacturer’s instructions and be sure to use the manufacturer’s recommended filling solution. The filling solution is not the same as the KCl used for the pH meter. The electrode should be disconnected from the meter when the membrane is replaced. If the membrane has been replaced properly there should be no air bubbles beneath the membrane and the membrane surface should not be wrinkled.

Sample Measurement

The DO should be measured at a representative point. Remember dissolved oxygen is a gas and is affected by turbulence and temperature. Measuring a DO sample at a point of high turbulence will not be representative. Likewise, measuring DO in shallow or quiet areas of a river will be different than in deeper and faster moving areas. A sampling plan will help define what information is needed and where the most appropriate location will be.

TEMPERATURE

Accurate temperature measurements are critical to many of the tests that are performed in the laboratory and out in the field. Temperature measurements should be made with good mercury thermometers or digital thermometers. Never rely upon the temperature display built into an incubator or drying oven for an accurate indication of the instrument's temperature. Use thermometers that have the sensitivity required for each test. For most tests, use a thermometer with graduations of 0.1° C. To verify the accuracy of laboratory thermometers, each thermometer should be calibrated against a NIST *certified thermometer* in its working range at least once per year. Once calibrated, laboratory thermometers should be flagged with the date of their last calibration and any correction factor. When a laboratory thermometer is read, the correction factor is included when the temperature is recorded to ensure that the most accurate temperature possible is maintained in the instrument.

ORGANIC CONTAMINANTS

These contaminants include herbicides and insecticides that are primarily used in agriculture applications, organic solvents used in industrial applications, organic by-products of industrial processes, and chemical by-products from chlorination of drinking water. Runoff from agricultural spraying or improper application techniques can be a major source of these contaminants in a surface water supply. Industrial discharges, accidental spills and improper disposal of hazardous wastes can also become sources of contamination.

These compounds are grouped together, for sampling purposes, into Volatile Organic Compounds or VOCs and Semi Volatile Organic compounds, which include Synthetic Organic Compounds or SOCs, acid herbicides, carbamates, and others. A few of the organic contaminants are listed on the below. They are all listed in Chapter 4.

ORGANIC CONTAMINANT	MCL (mg/L)
Benzene	**0.005**
Vinyl Chloride	**0.002**
Carbon Tetrachloride	**0.005**
Styrene	**0.1**
Total Trihalomethanes (TTHM)	**0.080**

RADIOACTIVE CONTAMINANTS

Most radioactive substances occur naturally in ground water and in some surface supplies. Some man-made substances may also enter drinking water supplies from processing facilities, mining areas, and nuclear power plants.

RADIOACTIVE CONTAMINANT	MCL
Radium 226 and 228	**5 pCi/L**
Gross Alpha Activity	**15 pCi/L**
Gross Beta Activity (man-made)	**4 millirem/yr**
Uranium	**30 µg/L (ppb)**

BACTERIOLOGICAL CONTAMINANTS

The coliform group of bacteria represents the indicator organisms used in determining bacteriological contamination. Their presence indicates the possibility that some pathogenic (disease causing) organisms may also be present. The MCL is exceeded when 2 (for systems required to collect 40 or fewer) or more than 5% of monthly routine compliance samples indicate the presence of Coliform bacteria (for systems required to collect more than 40). The presence of Total Coliform in any sample will require at least three repeat samples to be taken. These repeat samples must be taken within 24 hrs of notification of positive results.

The regulations call for a minimum of five samples for the month from any system that has positive sample results. Small systems that take only one sample per month have to take four (4) repeats when they get a total coliform positive test result. If any system has to take repeat samples, it must also take a minimum of five (5) routine samples the following month. Small systems that normally take less than 5 samples/month will have to increase the number to 5. They can return to normal sampling schedules the following month if no repeats are required.

SECONDARY CONTAMINANTS

There are certain substances in water that, although they do not present serious health hazards, can cause temporary physical discomfort and make the water unsuitable for use. Each state may determine which of these standards are included in their regulations. Chloride can make the water taste salty. This is also known as brackish water. Sulphate can cause minor gastro-intestinal problems. Iron and manganese can result in red or black water problems. The pH of the treated water can also create some digestive problems if it is very high or very low.
Recommended levels for secondary contaminants are:

SECONDARY CONTAMINANTS	MCL (mg/L)
Total Dissolved Solids	**500**
Chloride	**250**
Sulfate	**250**
Iron	**0.3**
Manganese	**0.05**
pH	**6.5-8.5**

MONITORING AND REPORTING

The public water systems are responsible for monitoring their water quality and reporting violations of the SDWA standards to the public. The New Mexico Environment Department is currently collecting and submitting chemical and radiochemical samples to the laboratories for all public water supplies. The program is funded through the “Water Conservation Fee” of 3 cents per 1000 gallons paid by each system. However, the systems will still be responsible for the results of testing and any public notification that may be required. Systems must retain copies of most chemical and radiochemical analysis records for 10 years (except lead and copper) and bacteriological test and turbidity results for 5 years. Records for lead and copper must be kept for 12 years. The system is required to report to NMED-DWB within 48 hours if they fail to comply with any NM Drinking Water Regulations.

SAMPLING SCHEDULES

Samples used in testing for chemical and biological contaminants must be collected periodically. Samples for most inorganic chemical analyses must be submitted once a year for surface supplies and once every compliance period for ground water supplies. Nitrate and nitrite samples must be submitted yearly. Sampling for organic compounds is done quarterly for the initial set of samples. After that, samples are collected yearly for surface water and every three years for ground water as long as no VOC's or SOC’s are detected. If they are found, the system must be sampled every quarter. Surface water systems (over 500) and large groundwater systems (over 10,000) must also collect TTHM/HAA5 samples quarterly.

Under the new Standardized Monitoring Rule, most chemical contaminants are monitored in a cycle of 3/6/9 years. Each three (3) year period is referred to as a compliance period. Microbiological sampling schedules are monthly. A minimum of one microbiological sample per month is normally required for the smallest systems. As the population served increases so does the number of samples required.

BACTERIOLOGICAL VIOLATIONS

When a positive BAC-T sample is reported repeat samples are required. If the repeats come back negative there is no violation. If more than 5% of the monthly samples are positive for Total Coliform (TC), including repeats, there is a non-acute violation that requires public notification. This means that any system taking less than 40 samples per month can only have 1 total coliform positive sample per month. Systems that take 40-59 samples can have two positives (5%). Systems that take 60-79 samples can have three positive results, and so on.

If the MCL is exceeded and any of the test results were Fecal Coliform or *E. coli* positive, a Tier 1 violation has occurred that requires notification through the electronic media. This sometimes triggers a “Boil Order” advisory. This type of violation used to be called an acute violation. If the MCL is exceeded and none of the positive results indicated a presence of Fecal Coliform/ *E. coli*, a Tier 2 violation has occurred. This level of violation used to be called a non-acute violation.

PUBLIC NOTIFICATION

The water system will be required to notify the public any time maximum contaminant levels are exceeded. These violations of the standards fall into one of three Tiers. A Tier 1 notice is required for a violation that has a significant potential for immediate adverse health effect. Tier 1 violations require 24-hour public notice and must be reported to NMED within 24 hours of violation notification. A Tier 2 notice is required for a violation that has potential for a serious, not immediate, adverse health effect and requires public notice within 30 days. A Tier 3 notice is required for violations not included in Tiers 1 or 2 and requires public notice within 12 months. Tier 2 and 3 violations must be reported to NMED within 10 days of notification. Systems must also submit a written certification of notification to NMED-DWB within 10 days for all tiers. A copy of the notice that was distributed to the public must also be included.

ACTION PLANS FOR VIOLATIONS

If a water supply exceeds the primary standards the water system must either cease using water from the contaminated source, provide adequate treatment to remove the contaminants, or locate a new source of supply that meets the standards. Blending may be done under certain conditions. The blended water must enter the system from a single point of entry.

VARIANCES, EXEMPTIONS AND WAIVERS

A system that is found to exceed the MCL for a primary contaminant may not be able to correct the problem for financial or technical reasons. Depending on the circumstances, the system may be granted a variance or exemption. The fact that a variance or exemption has been granted does not mean that the system is no longer required to notify the public of the problem. Notification must continue on a yearly basis until the system is in compliance.

A variance may be granted to a water system when its supply is found to exceed maximum standards and no technology is available to economically remove these contaminants. Variances may be extended at the discretion of the state regulatory agency if no treatment methods are made available during the period the variance is granted. A variance is granted only if no unreasonable health risk exists. A variance will not be granted for total coliform.

When a system is in need of more time to provide total treatment required to reduce contaminant levels to acceptable limits due to financial issues, an exemption can be granted to the water system. Exemptions will only be granted in cases that do not pose an immediate health risk. Exemptions will not be granted for total coliform.

Waivers or exclusions are granted to systems when the primacy agency determines that certain sampling requirements can be relaxed. For example, small systems may receive a waiver for VOC testing if the initial samples indicate that organics are not present or there is no potential source of organic pollution in the area. Waivers are not granted for total coliform, nitrate, and nitrite. All requests for variances, waivers, and exemptions must be directed to and approved by the NMED-DWB.

SURFACE WATER TREATMENT RULES

Any system that uses surface water must provide treatment of the supply. The original Surface Water Treatment Rule has been modified several times in the last 20 years. Springs and infiltration galleries are considered surface supplies if they are found to have groundwater that is under the direct influence of surface water (GWUDI). A speciation study of the organisms found in the suspected source of influence and the water that enters the system is used to determine whether a source is GWUDI.

The concerns about contamination by *Giardia* and *Cryptosporidium* have created the need for higher free chlorine residuals and longer disinfection contact times. The "CT" calculation is used to determine the necessary contact time at any given concentration. It is C x T = A, where C is the chlorine concentration, T is the contact time in minutes, and A is a temperature-based constant. If the A value is 60 and a 1.0 mg/L free residual is present, the T value or contact time in minutes would be 60. If the free residual were raised to 2.0 mg/L, the contact time would only need to be 30 minutes.

Removal of *Cryptosporidium* is based on a 2-log reduction of the numbers found in raw water for LT1 systems. A 2-log removal or deactivation would mean that 1% of the bacteria may survive or 99% were removed. A 4- log removal or deactivation would mean that 0.01% of the organisms may survive or 99.99% were removed**.** Some larger LT2 systems may be required to provide a 5.5-log removal. Log removals credits are assigned to the various treatment processes.

DISINFECTANTS AND DISINFECTION BYPRODUCTS RULE

Systems that use chlorine or chlorine dioxide may create chemicals like trihalomethanes **(**THMs**),** halo acetic acids (HAA5), chlorites, and perchlorates as by-products of the disinfection process. Trihalomethanes and halo acetic acids are formed when chlorine, bromine, or iodine combine with organic precursors that may be present in the source water. The four most common forms of trihalomethanes are chloroform, bromoform, dichlorobromomethane, and dibromochloromethane. Systems that use ozone as a disinfectant may also create bromates. All of these chemicals are carcinogens. Recent changes have set new MCLs for several disinfection by-products.

NEW D-DBP RULE CONTAMINANTS

CONTAMINANT	MCL (mg/L)
Total Trihalomethanes (TTHM)	**0.080**
Halo Acetic Acids (HAA5)	**0.060**
Bromate	**0.010**
Chlorite	**1**
Chlorine Dioxide	**0.8**
Chlorine	**4**
Chloramines	**4**

The system that is in violation may be required to change to a different means of disinfection or incorporate a process like activated carbon adsorption. Sample results from D-DBP testing must be reported within 10 days of the end of the monitoring period. Chlorine residual reports must be submitted every quarter. Stage1 D-DBP set maximum contaminant levels based on a running annual average, or RAA, of samples taken in the system, rather than individual sample results. Stage 2 D-DBP has changed to use LRAA or location-based running annual average of each individual contaminant for the calculation.

GROUND WATER RULE

The Ground Water Rule (GWR) was proposed to establish a strategy for identifying ground water systems that are at high risk for fecal contamination. Although disinfection is required for all surface water supplies, it is only required “as necessary” in ground water systems. Systems that are at risk must initiate corrective actions, which may include disinfection, and begin source water monitoring. The GWR is comprised of four major components:

1) Periodic sanitary surveys will be conducted on ground water system to identify and evaluate significant deficiencies such as defective casings or location too close to sources of surface pollution.
2) Monitoring of source water for the presence of *E. coli* and other enteric organisms will be required.
3) Corrective action must be taken by any system with significant deficiencies or source water contamination. This could include:
    A. Correcting structural deficiencies
    B. Eliminating the source of contamination
    C. Finding an alternative source of water
    D. Providing treatment to achieve a 4-log inactivation or removal of viruses
4) Compliance monitoring must be done to ensure that the treatment reliably achieves a 4-log reduction or inactivation of viruses.

Community water systems with outstanding performance and non-community water systems have until December 31, 2014 to complete the initial sanitary survey. All other community water systems complete the initial survey by December 31, 2012.

CONSUMER CONFIDENCE REPORTS (CCR)

The Consumer Confidence Report requires public water suppliers that serve the same people year round (community water systems) to provide consumer confidence reports (CCR) to their customers. These reports are also known as annual water quality reports or drinking water quality reports. The remaining public water systems in the U.S. are not required to provide CCRs. This is because these transient systems do not serve the same people on a day-to-day basis throughout the year. The CCR summarizes information regarding sources used (i.e., rivers, lakes, reservoirs, or aquifers), any detected contaminants, compliance and educational information. The reports are due to customers and the State by July 1st of each year. NMED must receive written notification by October 1st that the CCR has been distributed.

LEVEL 1 STUDY QUESTIONS

1. What is an MCL?
2. Why is turbidity a Primary Contaminant?
3. What is a nephelometer?
4. What is a repeat sample?
5. How long must bacteriological and chemical sampling results be kept?
6. How often must consumer confidence reports be prepared and distributed?

LEVEL 1 SAMPLE TEST QUESTIONS

1. A public water system is any system that serves a population greater than or equal to:

   A. 25
   B. 50
   C. 100

2. What is the maximum chlorine residual allowed by the Disinfectant-Disinfection By-Products Rule?

   A. 2 mg/l
   B. 4 mg/l
   C. 6 mg/l
   D. 8 mg/l

3. What type of contaminant is iron?

   A. Primary Inorganic
   B. Primary Organic
   C. Secondary

4. The failure of a public water system to comply with the NM Drinking Water Regulations must be reported to NMED within:

   A. 12 Hours
   B. 48 Hours
   C. 4 Days
   D. One week

LEVEL 2 STUDY QUESTIONS

1. What are the four components of the Ground Water Rule?
2. What notification is required for a Tier 1 violation?
3. What are the action levels for lead and copper?
4. How often must nitrate samples be submitted?

LEVEL 2 SAMPLE TEST QUESTIONS

1. The MCL for Total Trihalomethanes is:

   A. 0.010 mg/l
   B. 0.080 mg/l
   C. 0.200 mg/l

2. The SDWA Compliance Cycle for the Standardized Monitoring Rule consists of three:

   A. Years
   B. Compliance Periods
   C. Quarters
   D. Months

MICROBIOLOGICAL SAMPLING

WATERBORNE PATHOGENS

Water systems must strive to keep their drinking water free of disease causing organisms known as pathogens. There are five waterborne pathogens that can be found in all water supplies and two that are only found in surface water supplies. The protozoa that are found only in surface water supplies (*Giardia* and *Cryptosporidium*) form cysts and spores that protect them from cold temperatures. Because of this protection, they are much more difficult to kill with disinfectant chemicals.

DISEASES CAUSED BY WATERBORNE PATHOGENS

All Water Sources:
Typhoid
Paratyphoid (Types A & B)
Cholera
Dysentery
Hepatitis

Surface Water Only:
Cryptosporidium
Giardia

All of these diseases are caused by pathogenic bacteria except hepatitis, which is a virus. It is very difficult to identify any one particular pathogen by laboratory testing. To make testing more reliable and economical, the lab tests are designed to identify a large family of bacteria that are related to the disease causing bacteria, rather than identifying each type of pathogen.

COLIFORM GROUP OF BACTERIA

Coliform bacteria are enteric bacteria. This means that they are found in the intestinal tract of warm-blooded animals, including humans. These bacteria do not cause disease but are necessary for the digestion of food. The waterborne pathogens are also enteric organisms. Some of the bacterial pathogens are part of the coliform family.

If coliform bacteria are present in the water supply, pathogens may also be present. The coliform bacteria live longer in water and are easier to detect by laboratory testing. This is the reason the coliform group has been chosen as the indicator organism for waterborne pathogens. If coliform bacteria are not present it is assumed there are no pathogens present either.

The coliform family has been divided into two groups. Results may come back as either total coliform positive (TC positive) or fecal coliform positive, or (FC positive or *E. coli* positive.) Total coliform positive means that no human coliform are present. Fecal coliform positive indicates the presence of *E. coli*, which means there is a greater chance of pathogens being present. The laboratory tests for coliform include the MPN method, the Membrane Filter test, the Colilert test, and the presence-absence test. Most of the certified labs in New Mexico use either the colilert or membrane filter (MF) test. These tests require 100 ± 2.5 milliliters of sample.

MONTHLY SAMPLING

It is the responsibility of the system to collect samples for microbiological ("Bac-T") testing. It is very important to make sure samples are collected and tested and results reported properly. If a sample becomes contaminated due to poor sampling procedures or is not sent to the testing laboratory at the proper time, the system may technically be in violation of the dinking water regulations. This may result in the system having to notify the public of violations when the water is actually safe.

The NMED Drinking Water Regulations regarding microbiological sampling schedules set the minimum number of samples a water system must submit at one per month. As the size of the system increases so does the number of samples required each month (maximum of 480).

THE SAMPLE SITING PLAN

The sampling points for routine compliance sampling should be identified by a sample siting plan. The sample siting plan is created to locate sites for samples from all major parts of the system to assure that the entire system is represented over several months. Small systems must have at least two sample sites in the system.

Sample siting plans must identify the sample locations by address or description, when street addresses are not available. A map of the different sites in the system is also a requirement. A drawing of the specific location of the sample tap should also be included if necessary. The location of the sample site, once properly identified in the sampling plan, can then be referenced by location or address on the sample request form. Sample siting plans must be reviewed and approved by NMED-DWB. Sampling schedules should be set up to collect compliance samples during the first half of the month. This will allow time for repeat sample collection and testing, if necessary, before the end of the calendar month. Guidelines for creating samle siting plans are included in the Appendix.

THE SAMPLE BOTTLES

There are three types of sample bottles that are used by the majority of New Mexico certified microbiological testing labs. Sample bottles are provided by the lab and are sterilized prior to distribution. The three types of sample bottles are:

Nalgene - These are the only reusable bottles. NM SLD and several of the large municipal labs use them. They are sterilized by the lab and returned to circulation after each use. Bottles issued by SLD have "SLD" scratched into the top of the cap. SLD will only accept bottles that they issue for testing.

IDEXX – These bottles are clear plastic disposable containers that are supplied by the manufacturer with the colilert testing kits. Many labs that use the colilert method also issue the IDEX bottles.

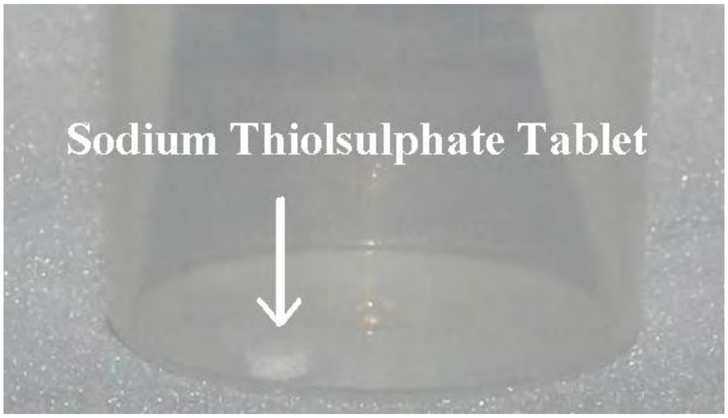
Snap Lid – These bottles have a hinged cap that has a snap-on type seal and a hinged latch to secure it. A plastic "Key" is used to secure the latch once the sample is collected.

NALGENE **IDEXX** **SNAP LID**

MICROBIOLOGICAL SAMPLE BOTTLES

PREPARING TO COLLECT THE SAMPLE

The first consideration in collecting a "Bac-T" sample is the sample bottle. These bottles are provided by the laboratory. They are sterilized prior to being distributed. They should be stored in a cool, dry place until they are needed for a sample. Sodium thiosulphate is added to the bottle before it is sterilized. It may be in the form of a clear liquid, a white powder, or a white tablet in the bottom of the bottle. The purpose of the sodium thiosulphate is to neutralize any chlorine residual that is present in the sample.



Things to remember when preparing to collect microbiological samples:

l. Don’t forget the chlorine residual test kit. If the system disinfects, a free chlorine residual needs to be present prior to sample collection. The residual must be recorded on the sample request form.

2. A cooler and blue ice packs (or regular ice) will be needed for sample preservation. If ice is used, plastic bags will be needed to keep the sample bottles and forms dry.

3. Use alcohol, soap, or latex gloves to prevent contamination due to dirty hands.

4. A pen should be used to fill out forms. Use tape and a permanent marker to label sample bottles.

5. Always take extra bottles and sample request forms. Repeat samples will also require red evidentiary seal tape.

6. Never wash out a bottle or even open it until you are ready to take the sample.

7. If a sample bottle has any dirt or junk in it or in the lid, <u>don't</u> <u>use</u> it. It's better to get a new bottle than to take a bad sample. See item 5.

SAMPLE COLLECTION

The location of the sample should be determined by referring to the sampling plan. Once the site has been selected, the next consideration is the collection of a valid sample. The procedure for collecting the sample is given below. These instructions should be carefully followed to prevent accidental contamination of the sample.

1. **Select a sampling point**. Always keep sanitary conditions in mind when selecting a sampling point. Never use a kitchen sink faucet that swivels or an outdoor faucet that drips. Any hoses, vacuum breakers or other attachments must also be removed. The least–used faucet at the site is preferred because there is less chance of contamination of the faucet. If an indoor faucet is selected, make sure the sink and faucet are clean. Never collect a sample from a hot water faucet. Remove the aerator screen (it might be contaminated). If the sample tap is located in an open area, clean brush and other vegetation for 3-5 feet away from the sample site.

Don’t select hinged faucets or faucets with attachments (Top)

Clean faucet and sink and remove aerator screen (Left)

Disinfect the faucet with alcohol if necessary. Avoid using bleach to clean the faucet. It doesn't evaporate as quickly and spills are a bigger problem to clean up. And finally, wash your hands or put on latex gloves before collecting the sample.

2. **Flush the line**. Open the tap and let the water run for 3-5 minutes or until the temperature changes. This will insure that the water being sampled is from the main and has not been standing in the customer's plumbing.

3. **Take a chlorine residual reading**. Once the line is properly flushed, throttle the flow down to an unaerated stream. Run a chlorine residual analysis and record the free chlorine residual. It must be included on the sample request form.

4. **Collect the sample**. Remove the cap, making sure that you do not touch the inside of the cap or the top of the sample bottle. Don't aerate the sample or allow it to splash on the outside of the bottle. Don't touch the inside of the cap or bottle. Don't blow or breathe into the sample bottle. Hold the bottle at a 45 degree angle while filling it.

Fill the bottle carefully to the 'fill line' or within about 1" of the top. This guarantees that there is at least 100ml of sample in the bottle. Do not fill it all the way. Never pour excess water out of the bottle. If you overfill it, draw another sample with one of those extra bottles you brought. An air space is needed to agitate the sample before it is tested at the lab.

Never set the cap down or leave it off longer than it takes to collect the sample. Hold the cap so that it is facing down to avoid having debris settle in it. Replace the cap and make sure it is tight

5. **Mark the bottles for identification**. Mark the disposable bottles directly and use a piece of tape or other suitable label to mark and identify the reusable Nalgene bottles. The information on the label should include the address, date and time. If records are being data based, the computer reference number should also be included.

6. **Refrigerate the sample.** The sample must be refrigerated to lower the temperature to 39° F or 4° C until tested. Always place the sample and the form in a plastic bag if ice is being used to refrigerate the sample. This is a good practice even if blue ice is being used because condensation can occur. If the samples are wet, the lab may reject them because they can't be sure the sample didn't leak.

REPORTING AND SHIPPING CONSIDERATIONS

The final consideration for microbiological sampling is the proper completion of the sample form and delivery to the lab. The instructions for the SLD microbiological sample request form are included in Chapter 7. The following information must be included on the sample form:

Microbiological Sample Request Form Data

l. System name, address, and identification number

2. Location of sampling site

3. Date and time sample was taken

4. Type of water sampled
   a. Routine Sample – Compliance
   b. Repeat Sample
   c. Special sample – Line break/raw water
   d. NMED monitor sample – Requested by NMED

5. Chlorine residual

6. Reference number (if it's a repeat sample)

7. Name of operator taking sample and Operator ID # or Water Sampler Technician ID Number

There are times when water systems need to collect microbiological samples for reasons other than monitoring compliance. New water lines and lines that have been repaired should be tested. Wells that have been disinfected should be tested. These samples must be identified as something other than a routine or compliance sample so they will not count as a violation against the system if they are found to be positive. This is done by checking "Special Sample" on the form.

There are certain requirements regarding the age of a microbiological sample. New Mexico Drinking Water Regulations state that the sample must be tested within 30 hours after it is taken. If a sample does not arrive at the lab within this time period it will not be tested. Most labs require that the sample arrive at the lab within 24 hours of collection so the testing can be done before it is 30 hours old.

Some labs, including SLD, do not accept samples on Fridays, since they are not open on Saturday to read the results. This means that it is important to take compliance samples on a Monday. If positive results are received on Wednesday, the repeats can be run on Thursday. Remember that repeat samples must be taken within 24 hours of notification. If you receive notification of a positive sample on Friday and the repeat can't be run until the following Monday a violation has occurred.

REPEAT SAMPLES

Anytime a microbiological sample result comes back positive, indicating the presence of total or fecal coliform/ *E.coli*, repeat samples must be taken. Three repeats are usually required. One must be taken at the site of the positive sample. The two samples must be taken upstream and downstream of the original site (within five service connections). These repeat samples must be taken within 24 hours of notification of positive results. They must be identified as a Repeat Sample on the sample form. Repeat samples must be sealed with a red evidentiary seal tape. The tape must cover the cap and extend down the sides of the bottle. The sample forms must also include the reference number for the positive sample.

There is an important exception to the three repeat samples rule. The regulations also state that when repeats are taken the minimum number of samples is raised to five for the month. **A system that collects just one sample a month must collect four repeat samples, when the sample is positive, in order to have five samples as required.**

Repeat sample with red seal tape

Whenever a system has to take repeat samples, a minimum of five routine samples must also be submitted the following month. This is only an issue for systems that normally turn in four or fewer samples each month. If the five samples are negative the system can return to its normal sampling schedule the next month.

Small systems that have fewer than four sampling sites have a problem complying with the "upstream and downstream" aspects of the repeat sampling requirements. In this case, samples should be taken at as many separate sites as possible and then wait a minimum of 2 hours before resampling enough sites to get the required number of samples.

VIOLATIONS

When repeat samples come back positive, the system is usually in violation of the microbiological standards (unless 40 or more samples are taken, then no more than 5% of the samples can be positive). If all of the positive samples were total coliform, it is a Tier 2 violation. If the MCL is exceeded and fecal coliform or *E. coli* positives occur in either the routine samples or the repeats, it becomes a Tier 1 violation requiring immediate public notification. In either case the NMED must be notified within 24 hours of any positive sample results. The water system is responsible for any public notification that may be required.

STUDY QUESTIONS

1. Who is responsible for the sample siting plan?
2. What is sodium thiosulphate used for?
3. What equipment is needed to collect a microbiological sample?
4. Which faucets should be avoided when selecting a sampling point?
5. Why should routine samples be collected early in the week?
6. Which samples require a red tape seal and chain of custody?
7. How are microbiological samples stored and transported?
8. How soon must repeat samples be collected after notification of positive results?

SAMPLE TEST QUESTIONS

1. Microbiological samples must be tested within ___ hours.

   A. 12
   B. 24
   C. 30
   D. 36

2. If a systems takes one microbiological sample a month, how many repeat samples must be taken when positive result are reported?

   A. 2
   B. 3
   C. 4
   C. 5

3. If positive results occur, what is the minimum number of samples for next month?

   A. 1
   B. 3
   C. 5
   D. 10

4. Repeat samples require upstream and downstream sampling. This must be done within how many service connection of the original sample?

   A. 2
   B. 3
   C. 4
   D. 5

5 How many milliliters of sample are required for testing?

   A. 50
   B. 75
   C. 100
   D. 125

6. A sample collected after a water line repair should be identified as a ____ on the sample request form.

   A. Routine sample
   B. Repeat Sample
   C. Special sample
   D NMED monitoring sample

ORGANIC SAMPLING

There are several laboratories in New Mexico that are certified to run organic analyses. The largest laboratory facility for organic testing is the NMDOH State Laboratory Division or SLD. The sample kits and bottles shown in this chapter are used by SLD. If a lab other than SLD is used the kit packaging and forms may vary, but the sampling protocols should still be the same.

SAMPLING KITS

There are different sampling kits used to collect the various organic samples for testing. Many of the contaminants are related chemically and are grouped together for sampling and monitoring purposes. The chemicals, listed on the following page, are grouped into Volatile Organic Compounds (VOC), semi-volatile organic compounds (SVOC), and Disinfection By-Products (DBP).

Volatile organic compounds are those chemicals that evaporate quickly. The solvents like benzene, toluene, and carbon tetrachloride are included in this group. Others, like styrene and vinyl chloride, are used to manufacture petrochemical products and plastics. Semi-volatile organic compounds are the heavier chemicals that do not evaporate. Many of these chemicals, like lindane and 2,4-D, are used as pesticides and herbicides. Organic disinfection by-products sampling includes total trihalomethanes (TTHM) and haloacetic acids (HAA5). TTHMs are volatile organics and haloacetic acids are semi-volatile.

Three separate sample kits are used to collect all of the organic samples. The kit for VOCs includes two sample bottles and a storage bag. The kit for the semi-volatile organic samples consists of ten sample bottles, three bottles of chemicals for sample preservation, and a dropper.

VOC Sample Kit (Top)

Semi-Volatile Organics Kit (left)
(Also includes VOC II sample Kit similar to VOC kit)

ORGANIC CONTAMINANTS

CONTAMINANT	MCL (mg/L)
Acrylamide	TT[1]
Alachor	0.002
Atrazine	0.003
Benzene	0.005
Benzo(a)pyrene	0.0002
Carbofuran	0.04
Carbon Tetrachloride	0.005
Chlordane	0.002
Chlorobenzene	0.1
2,4-D	0.07
Dalapon	0.2
DBCP	0.0002
o-Dichlorobenzene	0.6
p-Dichlorobenzene	0.075
1,2-Dichloroethane	0.005
1,1-Dichloroethylene	0.007
cis-1,2-Dichloroethylene	0.07
trans-1,2-Dichloroethylene	0.1
Dichlormethane	0.005
1,2-Dichloropropane	0.005
Di(2-ethylhexyl) adipate	0.4
Di(2-ethylhexyl) phthalate	0.006
Dinoseb	0.007
Dioxin	0.00000003
Diquat	0.02
Endothall	0.1
Endrin	0.002
Epichlorohydrin	TT[1]
Ethylbenzene	0.7
Ethylene dibromide	0.00005
Glyphosate	0.7
Heptachlor	0.0004
Heptachlor epoxide	0.0002
Hexachlorobenzene	0.001
Hexachlorocyclopentadiene	0.050
Lindane	0.0002
Methoxychlor	0.04
Oxamyl (Vydate)	0.2
Polychlorinated byphenyls (PCBs)	0.0005
Pentechlorophenol	0.001
Picloram	0.5
Simazine	0.004
Styrene	0.1
Tetrachloroethylene	0.005
Toluene	1
Toxaphene	0.003
Trichloroethylene	0.005
2,4,5-TP (Silvex)	0.05
1,2,4-Trichlorobenzene	0.07
1,1,1-Trichloroethane	0.2
1,1,2-Trichloroethane	0.005
Vinyl chloride	0.002
Xylenes (total)	10

[1] – TT refers to approved Treatment Technology rather than MCL

The disinfection by-products kit contains four bottles. Two are for TTHMs and two are for haloacetic acids. The bottles used for TTHMs are the same as those used for VOCs. They come in a separate plastic bag.

These kits may also contain a field blank, also called a trip blank. It is filled with de-ionized water at the lab and is used to establish baseline data for the other samples. If you receive a field blank with a kit, send it back to the lab with a sample form filled out to indicate that it is the field blank.

Disinfection By-Products Kit

PREPARATION FOR SAMPLE COLLECTION

Water is an excellent solvent for many organic compounds. When exposed to air, it has the ability to absorb volatile organic gases that may be present. There are special precautions that must be taken to avoid contamination of organic water samples. VOC I/II and THM samples are the easiest to contaminate. They must be collected with no headspace (air) in the bottle. Techniques used to correctly fill these sample bottles will be detailed with the individual collection instructions. Always observe the following precautions prior to collecting an organic water sample:

1) Check the sampling kit to make sure that all of the bottles and preservatives are present. Check the sample form(s) provided or download the sample form from the SLD website. A marker or pen will be needed to fill out labels and forms.

2) Personal hygiene issues can increase the risk of sample contamination, especially when taking VOC samples.

    A) No smoking – Tobacco smoke contains VOCs that can be absorbed by water.
    B) No hairspray/mousse, cologne/perfume, or breath spray/mouthwash for the same reason as tobacco smoke.
    C) Latex gloves should be worn during sample collection - Change gloves at each new sampling site.

3) Sample preservation will require refrigeration. A cooler with ice and a number of sealing plastic bags, to store sample bottles and forms, should be utilized.

4) Make sure all vehicle or other combustion engines are off and the area is well ventilated. VOCs in engine exhaust can also contaminate the samples.

5) Remove any aerator screens or other attachments from the faucet. Flush the faucet for 5-10 minutes to stabilize the water temperature.

VOC SAMPLE COLLECTION (EPA METHOD 524.2)

VOC samples are collected in duplicate. Two preservative chemicals, ascorbic acid and hydrochloric acid (HCL), are used for these samples. If the system is chlorinated, ascorbic acid will be added to each vial at the lab. Non-chlorinated systems will require the addition of hydrochloric acid. Never rinse the sample vials prior to collection.

There are two 40 ml glass vials included in the kit. Each has a Teflon septum in the screw cap. These sample vials must be filled with no air bubbles or headspace. This must be done to prevent potential contamination from airborne VOCs and the loss of very light VOCs from the sample.

VOC/VOC I/II Sample Vial, Screw Cap, and Septum

The following procedure should be used to collect the samples. (Repeat for both vials):

1) After the sample faucet has been properly flushed, reduce the flow to a trickle.

2) Remove the cap, hold the vial at a 45 degree angle. Position the vial as close to the faucet as possible and make sure the stream hits the side of the vial as it fills. Slowly fill the vial until it overflows the rim slightly.

3) Wait 20 seconds for any entrapped air to rise to the top. Then add 2 drops of 1:1 HCl using the dropper and acid provided by the lab.

4) Replace the cap without getting any air in the sample vial. There are two methods that can be used to do this:

    A) Fill the vial until you get a convex meniscus (bulging over the rim). Carefully slide the septum across the top of the vial and then screw on the cap.
    B) Fill the vial to get a convex meniscus and fill the cap (don’t remove the septum) with water. Hold the inverted cap next to the rim of the vial and carefully flip the cap over the top and screw it down.

5) Check to make sure there are no bubbles in the sample. If bubbles are present, remove the cap, add a little more sample water and try again.

6) Record site data, date, and time on the site labels and place them on each vial. Place the lab-supplied ID labels to each vial. Place vials in plastic bag and seal. Refrigerate (4^{o}C/39^{o}F) during storage and transport. Samples must be analyzed within 14 days of collection.

SEMI-VOLATILE ORGANIC COMPOUNDS SAMPLE KIT

There are seven different sets of samples associated with the semi-volatile organic compounds collection kit. Due to the short EPA holding requirements for these samples, you should contact the lab to schedule sample submission. Arrangements for sample bottle kits can be made at that time.

Some tests require duplicate samples; others only require a single sample. Most of the bottles and vials have preservative chemicals added to them by the lab. Never rinse the sample bottles prior to sample collection. Some samples require preservation with hydrochloric acid after collection. The sample bottles that require acid preservation have yellow labels.

Semi Volatile Organic Compounds Sample Kit

Test Requested	**# of Bottles**	**Description**
VOC II (EDB, DBCP, TCP) (775)[1]	2	40 ml vial w/preservative
Acid Herbicides (Chlorophenoxy) (758)[1]	2	250 ml amber bottle w/preservative
SOC (788)[1]	2	1 liter amber bottle w/preservative
Carbamates (772)[1]	1	40 ml vial w/preservative
Glyphosate (781)[1]	1	40 ml vial w/preservative
Endothall (782)[1]	1	250 ml amber bottle w/preservative
Diquat (783)[1]	1	1 liter PPE bottle w/ preservative

[1] – SLD Method number

Sodium thiosulfate ($Na_2S_2O_4$)	2	Mini-vials for sample preservation
1:1 Hydrochloric acid (HCl)	1	20 ml vial for sample preservations

VOC II SAMPLE COLLECTION (EPA METHOD 504.1)

Two 40 ml vials must be filled for this analysis. The samples are preserved with 3 mg of sodium thiosulfate. It is added at the lab. Do not pre-rinse the vials prior to sampling.

These samples should be from a site that is upstream of chlorination to avoid contamination with THMs, which interfere with this test. The procedures for collection are similar to VOCs, except that no HCl is added because sodium thiosulfate is used.

VOC II Sample Vials

The following procedure should be used to collect the VOC II samples: (Both vials)

1) After the sample faucet has been properly flushed, reduce the flow to a trickle.

2) Remove the cap, hold the vial at a 45 degree angle. Position the vial as close to the faucet as possible and make sure the stream hits the side of the vial as it fills. Slowly fill the vial until it overflows the rim slightly.

3) Replace the cap without getting any air in the sample vial. There are two methods that can be used to do this:

    A) Fill the vial until you get a convex meniscus (bulging over the rim). Carefully slide the septum across the top of the vial and then screw on the cap.
    B) Fill the vial to get a convex meniscus and fill the cap (don’t remove the septum) with water. Hold the inverted cap next to the rim of the vial and carefully flip the cap over the top and screw it down.

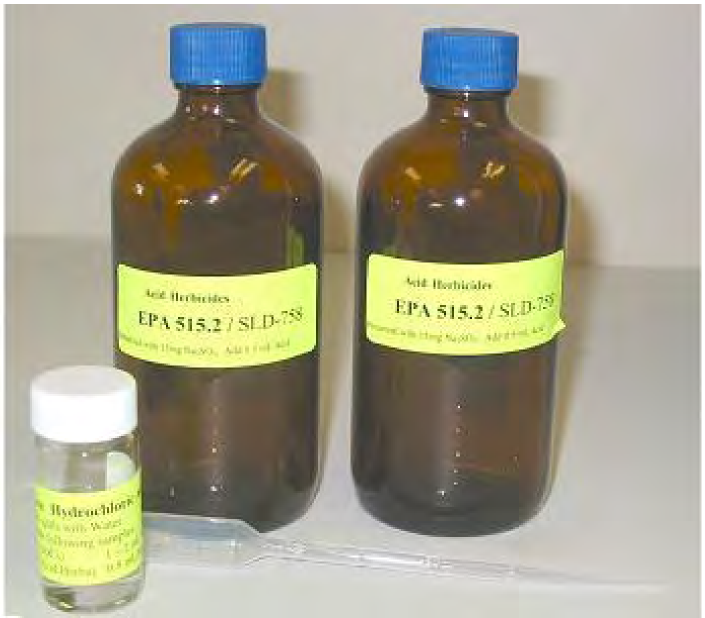
4) Check to make sure there are no bubbles in the sample. If bubbles are present, remove the cap, add a little more water and try again.

5) Record site data, date, and time on the site labels and place them on each vial. Place the lab-supplied ID labels to each vial. Place vials in plastic bag and seal. Refrigerate (4^{o}C/39^{o}F) during storage and transport.

ACID HERBICIDES SAMPLE COLLECTION (EPA METHOD 515.2)

Two 250 ml amber glass bottles must be filled for this analysis. The samples are preserved with 15 mg of sodium sulfite as a de-chlorination agent. It is added at the lab. Do not rinse the bottle before or during sampling.

Hydrochloric acid will also be added to the bottle after the sample is collected (as indicated by the yellow labels).



Acid Herbicides Sample Bottles
HCl Bottle and Dropper

The following procedure should be used to collect the acid herbicides samples:
(Both bottles)

1) After the sample faucet has been properly flushed, reduce the flow to an un-aerated stream.

2) Slowly fill the bottle up to the curve of the shoulder.

3) Replace the cap and invert the bottle several times to make sure the sodium sulfite is dissolved

4) Wait at least two minutes for de-chlorination to take place and then add one dropper of 1:1 HCl into each of the two bottles. The pH should be less than 2.0. Additional acid may be needed if the water is very alkaline.

5) Make sure the appropriate labels are in place. Refrigerate (4°C/39°F) during storage and transport.

SOC SAMPLE COLLECTION (EPA METHOD 525.2)

Two one liter amber glass bottles must be filled for this analysis. The samples are preserved with 50 mg of sodium sulfite as a de-chlorination agent. It is added at the lab. Do not rinse the bottle before or during sampling.

Hydrochloric acid (HCl) will also be added to the bottle after the sample is collected (as indicated by the yellow labels).

SOC Sample Bottles
HCl Bottle and Dropper

The following procedure should be used to collect the SOC samples: (Both bottles)

1) After the sample faucet has been properly flushed, reduce the flow to an un-aerated stream.

2) Slowly fill the bottle up to the curve of the shoulder.

3) Replace the cap and invert the bottle several times to make sure the sodium sulfite is dissolved

4) Wait at least two minutes for de-chlorination to take place and then add two droppers of 1:1 HCl into each of the two bottles. The pH should be less than 2.0. Additional acid may be needed if the water is very alkaline.

5) Make sure the appropriate labels are in place. Refrigerate (4°C/39°F) during storage and transport.

CARBAMATE SAMPLE COLLECTION (EPA METHOD 531.2)

One 40 ml glass vial must be filled for this analysis. The sample is preserved with 0.375 grams of citrate buffer used to stabilize the analytes. It is added at the lab. Do not rinse the bottle before or during sampling.

Sodium thiosulfate will also be added to the bottle before the sample is collected. Use one of the two vials of sodium thiosulfate provided with the kit. No preservative is needed for non-chlorinated samples.

The following procedure should be used to collect the carbamate samples:

1) After the sample faucet has been properly flushed, reduce the flow to a trickle.
2) If the sample is chlorinated, add the contents of the sodium thiosulfate vial to the sample.
3) Slowly fill the bottle and cap it. Air bubbles are not an issue.
4) Make sure the appropriate labels are in place. Refrigerate (4°C) during storage and transport.

Carbamate Sample Vial
Sodium Thiosulfate Vial

GLYPHOSATE SAMPLE COLLECTION (EPA METHOD 547)

One 40 ml amber glass vial must be filled for this analysis. The sample is preserved with 4 mg of sodium thiosulfate. It is added at the lab. Do not rinse the bottle before or during sampling. No other preservative is needed for this sample.

The following procedure should be used to collect the glyphosate samples:

1) After the sample faucet has been properly flushed, reduce the flow to a trickle.
2) Slowly fill the bottle and cap it. Air bubbles are not an issue.
3) Make sure the appropriate labels are in place. Refrigerate (4°C/39°F) during storage and transport.

Glyphosate Sample Vial

ENDOTHALL SAMPLE COLLECTION (EPA METHOD 548.1)

One 250 ml amber glass bottle must be filled for this analysis. If the sample is chlorinated, 20 mg of sodium thiosulfate must be added prior to the collection of the sample. Samples that are not chlorinated require no preservatives.

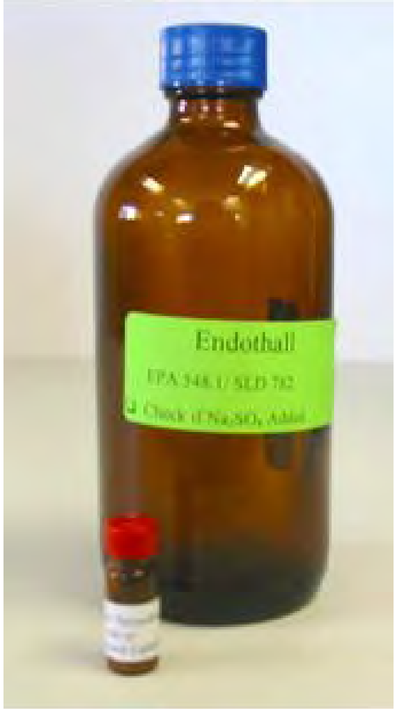
The following procedure should be used to collect the endothall samples:

1) After the sample faucet has been properly flushed, reduce the flow to an unaerated stream.

2) If the sample is chlorinated, add the contents of one of the sodium thiosulfate vials to the sample bottle. Skip this step if the sample is not chlorinated.

3) Slowly fill the bottle and cap it.

4) Make sure the appropriate labels are in place. Refrigerate (4°C/39°F) during storage and transport.



Endothall Sample Bottle
Sodium Thiosulfate Vial

DIQUAT SAMPLE COLLECTION (EPA METHOD 549.2)

One 1 liter polypropylene (PPE) bottle must be filled for this analysis. The sample is preserved with 100 mg of sodium thiosulfate. It is added at the lab. Do not rinse the bottle prior to or during sampling. If the sample is biologically active, like lake or river water, 1:1 sulfuric acid must be added to drop the pH below 2.0.

The following procedure should be used to collect the diquat samples:

1) After the sample faucet has been properly flushed, reduce the flow to an unaerated stream.

2) Slowly fill the bottle and cap it.

3) Make sure the appropriate labels are in place. Refrigerate(4°C/39°F) during storage and transport.

Diquat Sample Bottle

DISINFECTION BY-PRODUCTS SAMPLE KIT

There are two different sets of samples in the associated with the disinfection by-products kit. Samples are analyzed for both total trihalomethanes (TTHMs) and the haloacetic acid group (HAA5). The total trihalomethanes are VOCs and samples are collected in VOC vials. The issue of air bubbles is also a concern in TTHM samples. Haloacetic acids are semi volatile. HAA5 samples are collected in brown vials similar to those used for glyphosate samples.

Disinfection By-Products Kit

TTHM SAMPLE COLLECTION (EPA METHOD 524.2)

TTHM samples are collected in duplicate. There are two 40 ml glass vials included in the kit. Each has a Teflon septum in the screw cap. These sample vials must be filled with no air bubbles or headspace.

The sample is preserved with 3 mg of sodium thiosulfate. It is added at the lab. Never rinse the sample vials prior to collection.

Total Trihalomethanes Sample Vials

The following procedure should be used to collect the samples. (Repeat for both vials):

1) After the sample faucet has been properly flushed, reduce the flow to a trickle.

2) Remove the cap, hold the vial at a 45 degree angle. Position the vial as close to the faucet as possible and make sure the stream hits the side of the vial as it fills. Slowly fill the vial until it overflows the rim slightly.

3) Replace the cap without getting any air in the sample vial. There are two methods that can be used to do this:

    A) Fill the vial until you get a convex meniscus (bulging over the rim). Carefully slide the septum across the top of the vial and then screw on the cap.
    B) Fill the vial to get a convex meniscus and fill the cap (don't remove the septum) with water. Hold the inverted lid next to the rim of the vial and carefully flip the cap over the top and screw it down.

4) Check to make sure there are no bubbles in the sample. If bubbles are present, remove the cap, add a little more water and try again.

5) Record site data, date, and time on the site labels and place them on each vial. Place the lab-supplied ID labels to each vial. Place vials in plastic bag and seal. Refrigerate (4°C/39°F) during storage and transport. Samples must be analyzed within 14 days of collection.

HALOACETIC ACIDS SAMPLE COLLECTION (EPA METHOD 552.2)

Two 60 ml amber glass vial must be filled for this analysis. The samples are preserved with 6 mg of ammonium chloride, as a dechlorination agent. It is added at the lab. Do not rinse the bottle before or during sampling. No other preservative is needed for this sample.

The following procedure should be used to collect the HAA5 samples: (Both vials)

1) After the sample faucet has been properly flushed, reduce the flow to a trickle.

2) Slowly fill the vial and cap it. Air bubbles are not an issue.

3) Agitate the vial for one minute to dissolve the ammonium chloride.

4) Make sure the appropriate labels are in place. Refrigerate (4°C/39°F) during storage and transport.

Haloacetic Acid Sample Vials

PREPARING SAMPLES FOR SHIPMENT

Organic samples may have to be shipped or mailed to the lab. Here are the procedures to follow when shipping samples to SLD. Chapter 7 will cover how to properly fill out the sample request forms.

1) If you want the shipping cooler returned to you, mark the inside of the lid with your return address.

2) Check to make sure the samples are properly labeled. Each set of samples must include a request form. Place request forms in a zip lock baggie and tape it to the inside of the cooler cover.

3) When taking samples at multiple sites, make sure that each set of samples for a site are shipped in the same cooler. This will help the lab organize the samples. VOC I samples can be shipped with semi volatiles if a separate request form is included.

4) Pack the samples carefully. If not properly protected, they can be broken in shipment.

5) Chill samples to (4^{o}C/39^{o}F) at the time of collection. Samples that will not be received by the lab on the day they are collected must be shipped with sufficient ice to insure that they arrive at the lab at (4^{o}C/39^{o}F). Do not use too many ice packs or the samples may freeze causing the glass bottles to break.

6) Send samples in as soon as possible after sampling for analysis. Some samples must be analyzed within 7 days of collection. The shipping address for SLD is printed on the top of each request form:

Shipping address:
New Mexico Department of Health
SLD – Organics Division
700 Camino de Salud NE
Albuquerque, NM 87106

Mailing address:
New Mexico Department of Health
SLD – Organics Division
PO Box 4700
Albuquerque, NM 87196-4700

7) To schedule sampling or obtain bottles and supplies, please call the Organics section of the SLD at:

505-841-2566 – Semi-volatiles
505-841-2504 - Volatiles
505-841-2571 – Main supervisor

STUDY QUESTIONS

1) What are the personal hygiene issues that could affect VOC sample results?

2) Organic samples should be stored at what temperature?

3) What are the seven sets of samples included in the SLD semi volatile organic compound sample kit?

4) Which samples must be preserved with HCl?

5) What are the two sets of samples included in the SLD disinfection by-products sample kit?

SAMPLE TEST QUESTIONS

1) Which samples require collection without air bubbles?

   A) VOC samples
   B) VOC II samples
   C) TTHM samples
   D) All of the above

2) Most of the organic sample bottles have preservative chemicals added to them at the lab.

   A) True
   B) False

3) Which of the following samples requires only one sample bottle?

   A) SOC
   B) Halo acetic acids
   C) Endothall
   D) TTHM

4) Which of these samples is preserved with citrate buffer?

   A) VOC
   B) Carbamates
   C) Acid Herbicides
   D) Glyphosate

5) SLD semi volatile samples that require the addition of HCl have:

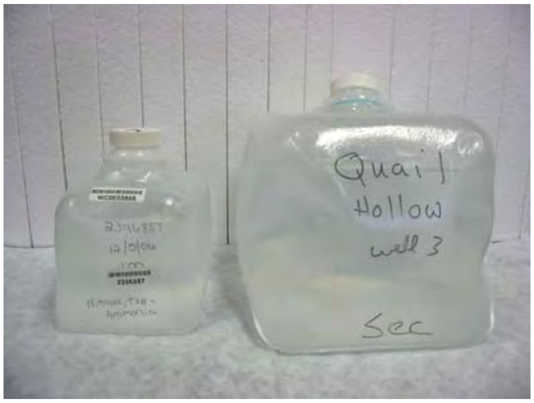
   A) Yellow labels
   B) Blue labels
   C) White labels
   D) Green labels

INORGANIC SAMPLING

Analyses of inorganic contaminants are run by two different sections of SLD. Heavy metal contaminants like lead, copper, iron, manganese, and mercury, are run by the Heavy Metals Section. The Water Chemistry Section is responsible for analyses for non-metals (fluoride, chlorite/bromate, nitrate/nitrite, chloride, sulfate), hardness (calcium and magnesium), alkalinity (carbonates, bicarbonates) and other metals like (sodium and potassium.) A complete listing of analyses run by both sections is included in Chapter 7.

SAMPLE CONTAINERS

The samples for heavy metal analysis are collected in a 1 liter (1 quart) plastic cubitainers. Most of the other inorganic samples are either 1 liter or 100 ml samples. The 1 liter samples can be collected in the 1 liter cubitainers. The 100 ml bottles can be either plastic or glass. The Complete Secondary and Major Cation/Anion Groups are 4 liters.



1 Liter and 4 Liter Cubitainers

100 Milliliter Bottle

Things to remember when preparing to collect inorganic samples:

1) A pen should be used to fill out forms. Use tape and a permanent marker to label sample bottles. Containers, forms, and ID labels are available from SLD.

2) A cooler and blue ice packs (or ice) will be needed for sample preservation. If ice is used, plastic bags will be needed to keep the sample bottles and forms dry.

3) Separate forms must be filled out for samples that going to each lab.

4) Remove screens and fittings from the faucet and flush the line for 3-5 minutes. **NOTE:** The exception this rule is the collection of Lead and Copper samples. They must be taken as a "first draw" samples after water has been standing in the plumbing. This issue will be addressed in the collection steps for lead and copper samples.

HEAVY METAL GROUP ANALYSES

There are three sets of group analyses run for heavy metals. Individual metals can also be run separately. The three sets of group analyses include:

ICP Scan – Al, Ba, Be, B, Cd, Ca, Cr, Co, Fe, Mg, Mn, Mo, Ni, Si, Ag, Sn, V, Zn - (EPA Method 200.7)

SDWA Group 1 – Sb, As, Ba, Be, Cd, Cr, Hg, Ni, Se, Tl (EPA Methods 200.8/200.9/245.1)

SDWA Lead and Copper - (EPA Methods 200.8/200.9)

ICP SCAN OR SDWA GROUP 1 SAMPLE COLLECTION

Use the following procedure to collect samples for ICP Scan or SDWA Group 1:

1) Reduce the flow from the sample faucet to an unareated stream.

2) Remove the lid and fill the 1 liter sample bottle to the neck.

3) Add enough nitric acid (HNO_3) to drop the pH to below 2.0. These samples have a long holding time. As a result, it isn't really necessary to preserve the sample in the field. This acid addition can be done at the lab if preferred. Just be sure to check that the preservative must be added at the lab on the sample form.

4) Replace the lid and mark the bottle with the appropriate ID label.

5) Refrigerate the sample ($4^oC/39^oF$) during storage and transport.

SDWA LEAD AND COPPER SAMPLE COLLECTION

The sampling protocol for inorganic samples for SDWA Lead and Copper sampling uses a slightly different protocol than the other heavy metals. Samples must be taken as a "first draw". For a sample to be considered a "first draw", water must have been standing in the customers plumbing for at least six hours, but not more than 18 hours. It must be drawn before any other usage takes place at the sampling site.

Because the sample must be taken early in the morning, these samples are sometimes drawn by customers. If this is the case, make sure the individual responsible for drawing the sample understands how to do it correctly. This is also a situation where it may be better to let the lab add the HNO_3 preservative later.

Use the following procedures to collect a lead and copper sample:

1) **DO NOT** flush the faucet.
2) Remove the lid and carefully fill the 1 liter sample bottle to the neck.
3) Add enough nitric acid (HNO_3) to drop the pH to below 2.0. This acid addition can be done at the lab if preferred. Just be sure to check that the preservative must be added at the lab on the sample form.
4) Replace the lid and mark the bottle with the appropriate ID label.
5) Refrigerate the sample ($4^oC/39^oF$) during storage and transport.

OTHER INORGANIC GROUP ANALYSES

The Water Chemistry section of SLD runs the analyses for the rest of the inorganic contaminants. These included the primary inorganic non-metals (Cyanide, Fluoride, Nitrate/Nitrite, etc.) and the secondary contaminants (Fe, Mn, Ca, Alkalinity, Sulfates, etc.) There are three sets of group analyses that can be run on the “non-heavy metal” inorganic contaminants:

Complete Secondary Group – Ca, Mg, K, Na, Fe, Mn, Hardness, Alkalinity, Bicarbonate, Carbonate, Chloride, Sulfate, Color, Conductivity, Odor, pH, Surfactants, TDS, and Turbidity – SLD Method 860
Major Anions and Cations Group – Ca, Mg, K, Na, Bicarbonate, Carbonate, Chloride, Sulfate, and TDS – SLD Method 867
Nutrients Group – Ammonia, Nitrate + Nitrite, Total Kjeldahl Nitrogen, Total Phosphorous – SLD Method 868

Analysis of individual contaminants is also available. The new sampling requirements for the latest disinfection by-products rule revision include sampling for inorganic disinfection by-products like chlorite and bromate. These programs are currently being set up at the Water Chemistry section and should be on-line by 2008.

COMPLETE SECONDARY OR MAJOR ANIONS/CATIONS SAMPLE COLLECTION

Use the following procedures to collect one of these group samples:

1) Reduce the flow from the sample faucet to an unareated stream.
2) Remove the lid and fill the 4 liter sample bottle. No preservative is needed.
3) Replace the lid and mark the bottle with the appropriate ID label.
4) Refrigerate the sample ($4^oC/39^oF$) during storage and transport.

NUTRIENTS GROUP SAMPLE COLLECTION

Use the following procedures to collect nutrients group samples:

1) Reduce the flow from the sample faucet to an unareated stream.

2) Remove the lid and fill the 1 liter sample. Preserve the sample by adding 2 ml of sulfuric acid (H_2SO_4)

3) Replace the lid and mark the bottle with the appropriate ID label.

4) Refrigerate the sample (4^{o}C/39^{o}F) during storage and transport.

SINGLE CHEMICAL SAMPLE COLLECTION

Single chemical analysis samples are collected in either 1 liter or 100ml bottles. The cations or metals require a 1 liter sample. Most of the anions or non-metals only require a 100 ml sample. The exception is the total cyanide, which is a 1 liter sample.

Use the following procedures to collect nutrients group samples:

1) Reduce the flow from the sample faucet to an unareated stream.

2) Remove the lid and fill the 1 liter sample. No preservative is needed except:
    A) Nitrate/Nitrite – H_2SO_4 to $pH < 2$
    B) Total cyanide – NaOH to $pH > 12$
    B) Free cyanide – NaOH to $pH > 12$

3) Replace the lid and mark the bottle with the appropriate ID label.

4) Refrigerate the sample (4^{o}C/39^{o}F) during storage and transport.

PREPARING SAMPLES FOR SHIPMENT

Inorganic samples may have to be shipped or mailed to the lab. Here are the procedures to follow when shipping samples to SLD. Chapter 7 will cover how to properly fill out the sample request forms.

1) If you want the shipping cooler returned to you, mark the inside of the lid with your return address.

2) Check to make sure the samples are properly labeled. Place request forms in a zip lock baggie and tape it to the inside of the cooler cover.

3) Chill samples to 4ºC at the time of collection and during storage. Samples that will not be received by the lab on the day they are collected must be shipped with sufficient ice to insure that they arrive at the lab at 4ºC.

4) Although the holding time for most of these samples is at least 28 days, there are a few samples that must be run within 14 days. Try to allow the lab at least one half of the holding time to run the analysis.

The shipping address for SLD is printed on the top of each request form:

Shipping address:
Chemistry Bureau - SLD
700 Camino de Salud NE
Albuquerque, NM 87106

Mailing address:
Chemistry Bureau - SLD
PO Box 4700
Albuquerque, NM 87196-4700

5) To schedule testing or obtain bottles and supplies, please call the Heavy Metals section supervisor at: **505-841-2593** or Water Chemistry section supervisor at: **505-841-2555**.

STUDY QUESTIONS

1. Which of the primary inorganic contaminants are considered to be heavy metals?

2. What is the name of the sampling group that includes nitrate and nitrite?

3. Which sampling groups do not require preservative chemical addition?

SAMPLE TEST QUESTIONS

1. Nitric acid (HNO_3) is not used as a preservative in:

   A. Lead and copper samples
   B. Heavy metal samples
   C. Nitrate/nitrite samples

2. All inorganic samples must be refrigerated at:

   A. 18ºC
   B. 10ºC
   C. 4ºC
   D. 0ºC

3. Which inorganic sample is preserved with sodium hydroxide (NaOH)?

   A. Fluoride
   B. Total Cyanide
   C. Iron
   D. Alkalinity

4. How long must a first draw sample for lead and copper sit in the plumbing?

   A. 30-60 minutes
   B. 2-4 hours
   C. 6-18 hours
   D. 24-36 hours

RADIOLOGICAL SAMPLING

There are several laboratories in New Mexico that are certified to run radiological analyses. The largest laboratory facility for radiological testing of water samples is the NMDOH State Laboratory Division or SLD. Although the request forms may differ, the sampling protocols and information needed should be similar.

Radiological sampling and analysis requirements were changed in 2003. The revisions are summarized below. More information regarding analyses and substitution parameters are listed in Chapter 7.

A) There is no substitution option for Radium - 228 analyses.

B) Uranium has been added. It has an MCL of 30 µg/L (ppb) with a substitution of Gross alpha option (141.26.a.5).

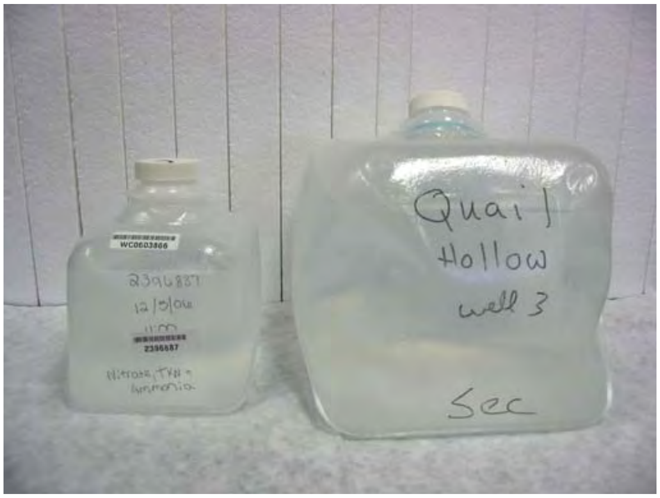
C) The gross alpha substitution for Ra-226 has been retained.

D) Compositing for gross alpha, U-mass, Radium – 226, and Radium – 228 has been retained

E) The monitoring frequency has been changed to follow the 3-6-9 year Standardized Monitoring Rule.

SAMPLE CONTAINERS

Most of the samples for radiological analysis are collected using either 1-quart or 1-gallon cubitainers, similar to those used for inorganic samples. The exception is Radon – 222 samples. They must be collected in 40 ml vials similar to those used for VOC samples.



1-quart and 1-gallon Cubitainers

Things to remember when preparing to collect radiological samples:

1) A pen should be used to fill out forms. Use tape and a permanent marker to label sample bottles. Containers, forms, and ID labels are available from SLD.

2) A cooler and blue ice packs (or ice) will be needed for sample preservation. If ice is used, plastic bags will be needed to keep the sample bottles and forms dry.

3) Separate forms must be filled out for each set samples.

4) Remove screens and fittings from the faucet and flush the line for 3-5 minutes.

SDWA SEQUENTIAL FLOW SCHEME SAMPLE COLLECTION (EPA 900.0/903.1, ETC.)

Samples for the SDWA Sequential Flow Scheme analyses (SLD 801/803) are collected in 1-gallon cubitainers. The sample volume depends on whether the Radium – 228 analysis is also requested. If the Radium – 228 analysis is not included (801), the sample volume is one gallon. If it is (803), two gallons of sample is required. Concentrated nitric acid (HNO_3) is used for sample preservation. The pH must be lowered to 2.0 or less. This can usually be achieved by adding 5 ml of HNO_3 per gallon.

The following procedure should be used to collect the sequential flow scheme samples:

1) After the sample faucet has been properly flushed, reduce the flow to an unaerated stream.

2) Add 5 ml of HNO_3 to the 1-gallon sample container

2) Slowly fill the sample container and cap it. Remember: Two gallons of sample are needed if the 803 analyses are to be run (with Radium – 228).

3) Make sure the appropriate labels are in place.

NOTE: These same procedures should be followed for any of the other combination group analyses. They all require one gallon of sample.

GROSS ALPHA/BETA SAMPLE COLLECTION (EPA 900.0)

Samples for the Gross Alpha/Beta analyses (SLD 811) are collected in 1-quart cubitainer. No sample preservation is needed for this sample.

The following procedure should be used to collect the sequential flow scheme samples:

1) After the sample faucet has been properly flushed, reduce the flow to an unaerated stream.

2) Slowly fill the sample container and cap it.

3) Make sure the appropriate labels are in place.

RADON - 222 SAMPLE COLLECTION (EPA 913.0)

Samples for the Radon – 222 analysis (SLD 834) are collected in two 40 ml vials like those used to collect VOCs. Radon – 222 is a radioactive gas that is dissolved in water. Therefore, the sample must be collected with no headspace to prevent the Radon gas from coming out of solution. Sample preservation requires refrigeration to ($4^oC/39^oF$) during storage. **Do not** acidify this sample.

The following procedure should be used to collect the samples. (Repeat for both vials):

1) After the sample faucet has been properly flushed, reduce the flow to a trickle.

2) Remove the cap, hold the vial at a 45 degree angle. Slowly fill the vial until it overflows the rim slightly.

3) Replace the cap without getting any air in the sample vial. There are two methods that can be used to do this:

    A) Fill the vial until you get a convex meniscus (bulging over the rim). Carefully slide the septum across the top of the vial and then screw on the cap.
    B) Fill the vial to get a convex meniscus and fill the cap (don't remove the septum) with water. Hold the inverted cap next to the rim of the vial and carefully flip the cap over the top and screw it down.

4) Check to make sure there are no bubbles in the sample. If bubbles are present, remove the cap, add a little more sample water and try again.

5) Make sure the appropriate labels are in place. Refrigerate ($4^oC/39^oF$) during storage and transport. Due to a 4-day holding time, sample must be submitted immediately. No submissions on Fridays without special contact.

STUDY QUESTIONS

1. What was changed in 2003 regarding the monitoring schedules for radiological contaminants?

2. Which chemical was added to the radiological contaminant group in 2003?

4. Which sample has a 4-day holding time?

   A. Sequential Flow Scheme
   B. Radon – 222
   C. Gross alpha/beta
   D. Uranium

SAMPLE TEST QUESTIONS

1. Most radiological samples are preserved using:

   A. Hydrochloric Acid
   B. Sodium thiosulfate
   C. Nitric acid
   D. Sulfuric Acid

2. Which sample must be collected with no headspace?

   A. Gross Alpha/Beta
   B. Radon – 222
   C. Radium – 228
   D. All of the above

3. Radon is collected in a:

   A. 1-quart container
   B. 1-gallon container
   C. 150 ml container
   D. Two 40 ml vials

FILLING OUT THE FORMS

Although there are a number of certified laboratories in New Mexico, this study guide will focus on the sample request forms used by SLD. The forms used by other labs may differ in presentation, but most of the information needed to correctly fill out the form should still be the same. The analyses will follow the same EPA methodologies, though coding for the various analyses may differ from lab to lab. SLD has recently moved to the use of two basic sample request forms. One is the microbiological sample request form and the other is a new unified chemical analysis sample request form. The unified chemical analysis form can be used with any of the inorganic, organic, or radiological samples required for regulatory monitoring.

MICROBIOLOGICAL SAMPLE REQUEST FORM - SLD

NMDOH uses a one-page form for microbiological samples. It is printed in red to aid SLD in tracking originals separate from the copies that are made. The form is constructed in rows of blocks and is printed on the next page. Instructions for completing the form are listed below (starting from the top):

ROW 1

Time and Date of Receipt: Do not fill in the left box. It is for the time and date stamp at SLD.

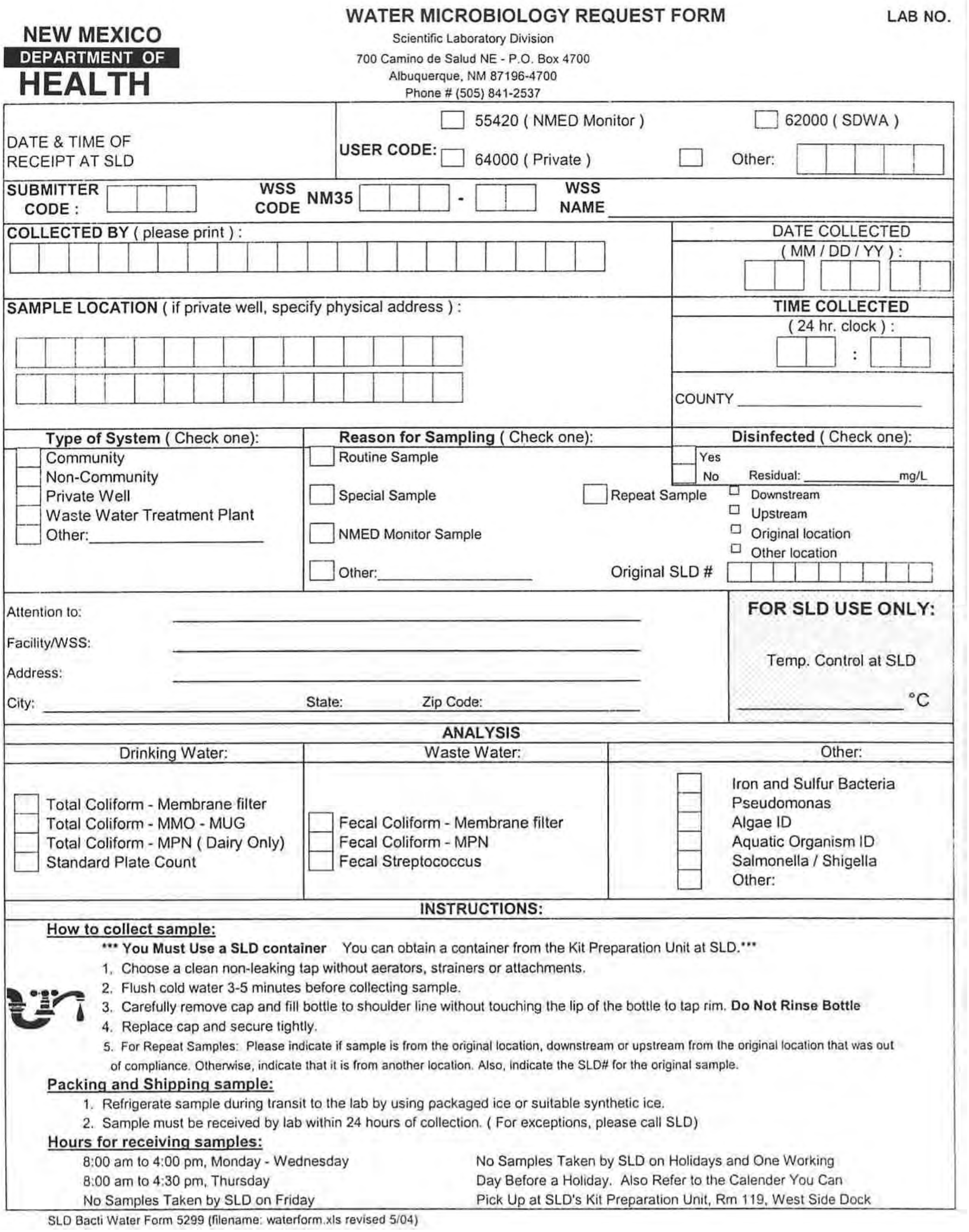
User Code: Samples taken by water systems for regulatory compliance will be 62000 (SDWA). When NMED employees, not a water system, collect samples, check 55420 (NMED Monitor). Private samples, domestic wells and systems NOT required to pay the Water Conservation Fee should check 64000 (Private). All Repeat or Special samples check 64000 (they are no paid by the Conservation Fee).

ROW 2

Submitter Code: Individuals who take samples to SLD for analysis will be assigned a 3-digit submitter code.

WSS Code: Each PWS has a 9-digit code (NM35XXX-XX) number assigned by NMED. Federal PWS's have a 9 digit code as well, 3509XXXXX or 3506XXXXX, depending on the EPA Region they report to – This requires the submitter to mark out the "NM35" on the form and inserting the correct designation.

WSS Name: Print the system name.



NEW MEXICO
DEPARTMENT OF
HEALTH

WATER MICROBIOLOGY REQUEST FORM

Scientific Laboratory Division
700 Camino de Salud NE - P.O. Box 4700
Albuquerque, NM 87196-4700
Phone # (505) 841-2537

LAB NO.

DATE & TIME OF RECEIPT AT SLD

USER CODE: ☐ 55420 (NMED Monitor) ☐ 62000 (SDWA) ☐ 64000 (Private) ☐ Other: ☐☐☐☐☐

SUBMITTER CODE : ☐☐☐ **WSS CODE** **NM35** ☐☐☐ - ☐☐ **WSS NAME** ____________

COLLECTED BY (please print) :

DATE COLLECTED (MM / DD / YY) : ☐☐ ☐☐ ☐☐

SAMPLE LOCATION (if private well, specify physical address) :

TIME COLLECTED (24 hr. clock) : ☐☐ : ☐☐

COUNTY ____________

Type of System (Check one):
- ☐ Community
- ☐ Non-Community
- ☐ Private Well
- ☐ Waste Water Treatment Plant
- ☐ Other:____________

Reason for Sampling (Check one):
- ☐ Routine Sample
- ☐ Special Sample
- ☐ Repeat Sample
- ☐ NMED Monitor Sample
- ☐ Other:____________

Disinfected (Check one):
- ☐ Yes
- ☐ No Residual: ____________mg/L

- ☐ Downstream
- ☐ Upstream
- ☐ Original location
- ☐ Other location

Original SLD # ☐☐☐☐☐☐☐☐☐

Attention to: ____________
Facility/WSS: ____________
Address: ____________
City: ____________ State: Zip Code: ____________

FOR SLD USE ONLY:

Temp. Control at SLD
____________ °C

ANALYSIS

Drinking Water:	Waste Water:	Other:
☐ Total Coliform - Membrane filter ☐ Total Coliform - MMO - MUG ☐ Total Coliform - MPN (Dairy Only) ☐ Standard Plate Count	☐ Fecal Coliform - Membrane filter ☐ Fecal Coliform - MPN ☐ Fecal Streptococcus	☐ Iron and Sulfur Bacteria ☐ Pseudomonas ☐ Algae ID ☐ Aquatic Organism ID ☐ Salmonella / Shigella ☐ Other:

INSTRUCTIONS:

How to collect sample:

***** You Must Use a SLD container** You can obtain a container from the Kit Preparation Unit at SLD.***

1. Choose a clean non-leaking tap without aerators, strainers or attachments.
2. Flush cold water 3-5 minutes before collecting sample.
3. Carefully remove cap and fill bottle to shoulder line without touching the lip of the bottle to tap rim. **Do Not Rinse Bottle**
4. Replace cap and secure tightly.
5. For Repeat Samples: Please indicate if sample is from the original location, downstream or upstream from the original location that was out of compliance. Otherwise, indicate that it is from another location. Also, indicate the SLD# for the original sample.

Packing and Shipping sample:

1. Refrigerate sample during transit to the lab by using packaged ice or suitable synthetic ice.
2. Sample must be received by lab within 24 hours of collection. (For exceptions, please call SLD)

Hours for receiving samples:

8:00 am to 4:00 pm, Monday - Wednesday
8:00 am to 4:30 pm, Thursday
No Samples Taken by SLD on Friday

No Samples Taken by SLD on Holidays and One Working Day Before a Holiday. Also Refer to the Calender You Can Pick Up at SLD's Kit Preparation Unit, Rm 119, West Side Dock

SLD Bacti Water Form 5299 (filename: waterform.xls revised 5/04)

ROW 3

Collected By: Print sampler's name.

Date Collected: Print six-digit date.

ROW 4

Sample Location: Print location address or physical location of sample site.

Time Collected: Print time of collection as 24-hour military time. 4:30pm would be 16:30. The thirty-hour clock is based on this entry.

County: Print the county name.

ROW 5

Type of system: Check the system type (Community, Non-Community, Private.)

Reason for Sampling:

- **Routine Samples** are those taken for monthly quarterly compliance.
- **Special Samples** are for samples like raw water or line repair samples that are not taken for compliance monitoring.
- **NMED Monitor Samples** are samples that are collected by NMED. They may be in response to violations or disease outbreak.
- **Other samples** are essentially any samples that do not fall into one of the other categories.
- **Repeat Samples** are taken when positive results occur. Check one of the boxes that indicate whether it was at the **original location**, **upstream**, or **downstream**. The **other location** option is for systems that only take one sample a month and need four repeat samples as a result. Also print the **SLD number** of the original positive sample for each repeat.

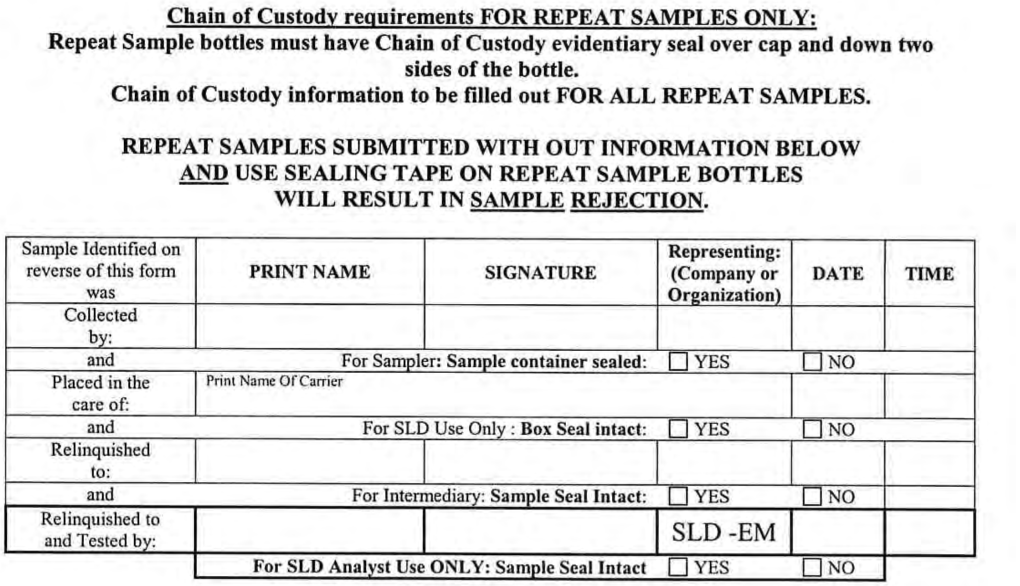
Row 6

Facility/WSS Mailing Address: Print the system's mailing address. Do not write in box marked "FOR SLD USE ONLY". The sample temperature will be entered by SLD upon receipt.

Row 7

Analysis – Drinking Water: There are four boxes in this row. Analyses of SDWA microbiological samples are either Membrane Filter or MMO-MUG, the Colilert analysis. Most labs are now using Colilert method. If you want the lab to use the MMO-MUG method, check the "Total Coliform – MMO-MUG" box. If you want the lab to use the membrane filter method, check the "Total Coliform – Membrane Filter " box.

Analysis – Other: Water systems may want to analyze their water for algae, iron and sulfur bacteria, or other aquatic organisms. This box is used for those tests.



Chain of Custody requirements FOR REPEAT SAMPLES ONLY:
Repeat Sample bottles must have Chain of Custody evidentiary seal over cap and down two sides of the bottle.
Chain of Custody information to be filled out FOR ALL REPEAT SAMPLES.

REPEAT SAMPLES SUBMITTED WITH OUT INFORMATION BELOW
AND USE SEALING TAPE ON REPEAT SAMPLE BOTTLES
WILL RESULT IN SAMPLE REJECTION.

Sample Identified on reverse of this form was	**PRINT NAME**	**SIGNATURE**	**Representing: (Company or Organization)**	**DATE**	**TIME**
Collected by:					
and	For Sampler: **Sample container sealed:**		☐ YES	☐ NO	
Placed in the care of:	Print Name Of Carrier				
and	For SLD Use Only : **Box Seal intact:**		☐ YES	☐ NO	
Relinquished to:					
and	For Intermediary: **Sample Seal Intact:**		☐ YES	☐ NO	
Relinquished to and Tested by:			SLD -EM		
	For SLD Analyst Use ONLY: Sample Seal Intact		☐ YES	☐ NO	

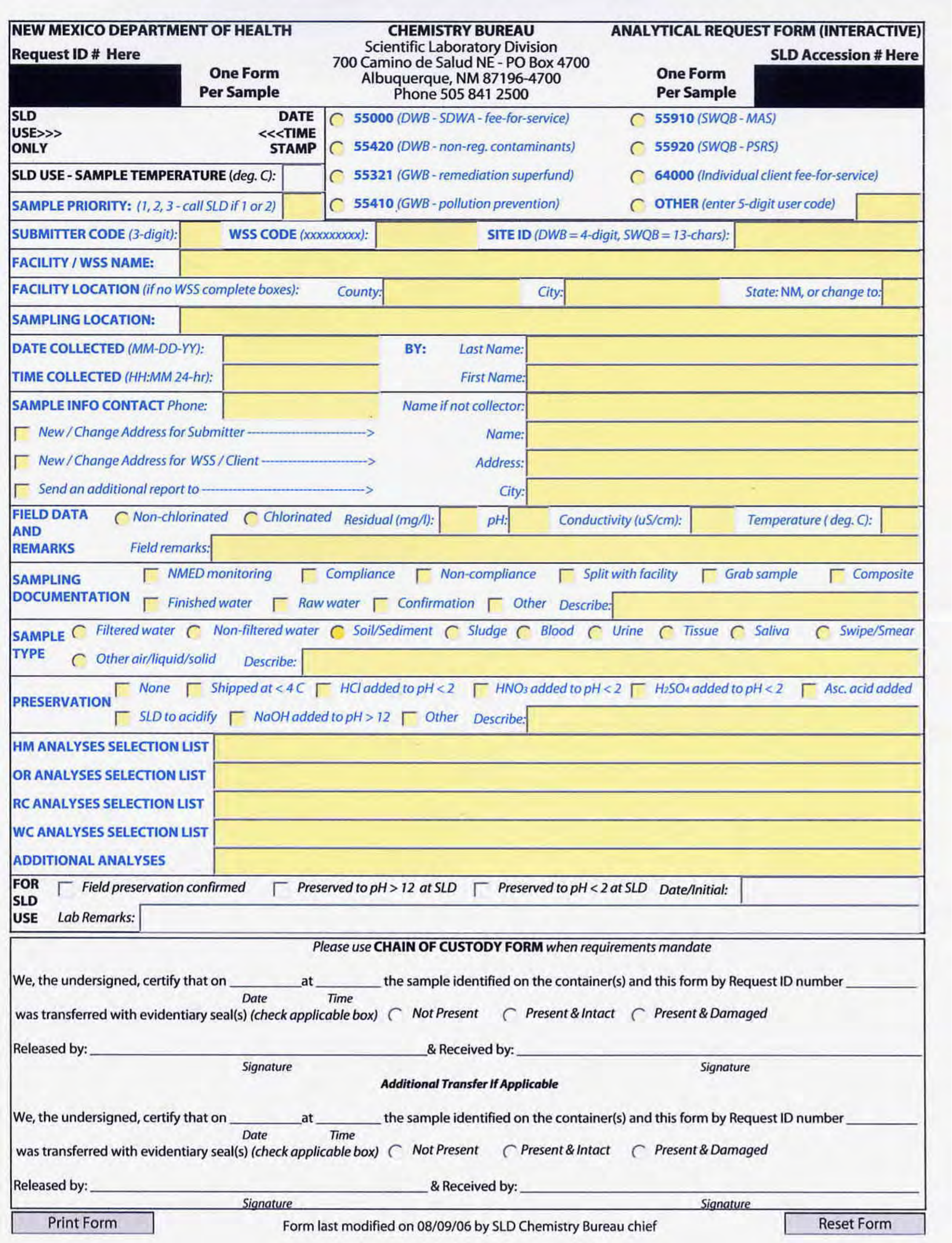
CHAIN OF CUSTODY DOCUMENTATION

Repeat samples must be sealed with red evidentiary seal tape and include a “Chain of Custody.” This document identifies who has handled the sample. The time and date are also recorded at each step of the process. The chain of custody document shown above is used by SLD. It is printed on the backside of the microbiological sample request form. Failure to properly document the chain of custody will result in sample rejection.

INTERACTIVE ANALYTICAL REQUEST FORM - SLD CHEMISTRY BUREAU

There are several labs that are certified to run chemical analyses for SDWA compliance. The request forms used by the individual labs may vary in design and coding for the different analyses may vary. A unified single-page interactive form has been designed by SLD to replace the old request forms used by the individual chemistry sections. The old forms are still being sent out with the individual sampling kits and can still be used. The new form can be accessed from the SLD website. The web address to access the form is: **http://www.sld.state.nm.us/lab**

SLD requires that each analytical sample have one form associated with it. It is possible to send in several sample containers with a single form and one Request ID number (like the semi-volatile kit for organics). A sample may also have several request analyses associated with it. Submitters need not send multiple forms in this case. A separate sample form must be used for analyses from different sections (one form/sample/section). Forms and samples must arrive together. The 7-digit ID numbers are normally sent out for submitters to attach to the form and sample containers.



NEW MEXICO DEPARTMENT OF HEALTH
Request ID # Here
[redacted]
One Form Per Sample

CHEMISTRY BUREAU
Scientific Laboratory Division
700 Camino de Salud NE - PO Box 4700
Albuquerque, NM 87196-4700
Phone 505 841 2500

ANALYTICAL REQUEST FORM (INTERACTIVE)
SLD Accession # Here
One Form Per Sample
[redacted]

SLD USE>>> ONLY **DATE <<<TIME STAMP**

○ **55000** *(DWB - SDWA - fee-for-service)*
○ **55420** *(DWB - non-reg. contaminants)*
○ **55321** *(GWB - remediation superfund)*
○ **55410** *(GWB - pollution prevention)*
○ **55910** *(SWQB - MAS)*
○ **55920** *(SWQB - PSRS)*
○ **64000** *(Individual client fee-for-service)*
○ **OTHER** *(enter 5-digit user code)*

SLD USE - SAMPLE TEMPERATURE *(deg. C)*:

SAMPLE PRIORITY: *(1, 2, 3 - call SLD if 1 or 2)*

SUBMITTER CODE *(3-digit)*: **WSS CODE** *(xxxxxxxxx)*: **SITE ID** *(DWB = 4-digit, SWQB = 13-chars)*:

FACILITY / WSS NAME:

FACILITY LOCATION *(if no WSS complete boxes)*: *County:* *City:* *State: NM, or change to:*

SAMPLING LOCATION:

DATE COLLECTED *(MM-DD-YY)*: **BY:** *Last Name:*

TIME COLLECTED *(HH:MM 24-hr)*: *First Name:*

SAMPLE INFO CONTACT *Phone:* *Name if not collector:*

☐ *New / Change Address for Submitter ---------------------------->* *Name:*

☐ *New / Change Address for WSS / Client ----------------------->* *Address:*

☐ *Send an additional report to ------------------------------------>* *City:*

FIELD DATA AND REMARKS ○ *Non-chlorinated* ○ *Chlorinated* *Residual (mg/l):* *pH:* *Conductivity (uS/cm):* *Temperature (deg. C):*
Field remarks:

SAMPLING DOCUMENTATION ☐ *NMED monitoring* ☐ *Compliance* ☐ *Non-compliance* ☐ *Split with facility* ☐ *Grab sample* ☐ *Composite*
☐ *Finished water* ☐ *Raw water* ☐ *Confirmation* ☐ *Other* *Describe:*

SAMPLE TYPE ○ *Filtered water* ○ *Non-filtered water* ● *Soil/Sediment* ○ *Sludge* ○ *Blood* ○ *Urine* ○ *Tissue* ○ *Saliva* ○ *Swipe/Smear*
○ *Other air/liquid/solid* *Describe:*

PRESERVATION ☐ *None* ☐ *Shipped at < 4 C* ☐ *HCl added to pH < 2* ☐ *HNO_3 added to pH < 2* ☐ *H_2SO_4 added to pH < 2* ☐ *Asc. acid added*
☐ *SLD to acidify* ☐ *NaOH added to pH > 12* ☐ *Other* *Describe:*

HM ANALYSES SELECTION LIST

OR ANALYSES SELECTION LIST

RC ANALYSES SELECTION LIST

WC ANALYSES SELECTION LIST

ADDITIONAL ANALYSES

FOR SLD USE ☐ *Field preservation confirmed* ☐ *Preserved to pH > 12 at SLD* ☐ *Preserved to pH < 2 at SLD* *Date/Initial:*
Lab Remarks:

Please use **CHAIN OF CUSTODY FORM** *when requirements mandate*

We, the undersigned, certify that on ____________ at __________ the sample identified on the container(s) and this form by Request ID number __________
Date *Time*
was transferred with evidentiary seal(s) *(check applicable box)* ○ *Not Present* ○ *Present & Intact* ○ *Present & Damaged*

Released by: ______________________________ & Received by: ______________________________
Signature *Signature*

Additional Transfer If Applicable

We, the undersigned, certify that on ____________ at __________ the sample identified on the container(s) and this form by Request ID number __________
Date *Time*
was transferred with evidentiary seal(s) *(check applicable box)* ○ *Not Present* ○ *Present & Intact* ○ *Present & Damaged*

Released by: ______________________________ & Received by: ______________________________
Signature *Signature*

Print Form

Form last modified on 08/09/06 by SLD Chemistry Bureau chief

Reset Form

INTERACTIVE FORM COMPLETION

The unified form has been designed with interactive fields and drop-down menus for completion on a computer. Those areas that are interactive have blue text and yellow boxes (gray if printed in black and white). Information can be entered in boxes and checked in circles and squares. Drop-down menus can be used for date and sample analysis selection. Once the form is completed, it can be printed using the "Print Form" button at the bottom. The form can also be printed and filled out by hand. The form cannot be saved with completed information though. Instructions for completing the form are listed below (starting from the top):

Time and Date of Receipt: Do not fill in the left box. It is for the time and date stamp at SLD.

User Code: Samples taken by water systems for regulatory compliance will be 55000 (DWB – SDWA – Fee-for-service). When samples are for non-regulated contaminants, check 55420 (DWB – nonreg. contaminants)*. For samples from private systems and domestic wells, check 64000 (Individual client fee-for-service).

* SLD uses the 55420 code for secondaries, radon in water, regulated contaminants that are NMED monitoring or special samples, ISDE or LT2 SWMR samples, or emergency Priority 2 samples (following a water tank break-in, for example). Emergency Priority 1 samples come in under user code 55000.

Sample Priority: If the sample priority is Level 1 or 2, call SLD for scheduling. Level 3 is the normal priority.

Submitter Code: Individuals who take samples to SLD for analysis will be assigned a 3-digit submitter code.

WS Code: Enter NM35 followed by the 5-digit PWS ID number (XXX-XX) assigned by NMED.

Facility Name and Location: Enter name, address, county, city, and state.

Date Collected: Drop-down calendar to enter date.

Time Collected: Enter time of collection as 24-hour military time.

By: Enter sample collector's first and last names.

Sample Info Contact: Enter the phone number for system contact/collector. Also check the appropriate for address changes of system/client or collector. Check the appropriate box for an additional report. Print the new name and address.

Field Data and Remarks: Check whether the system is chlorinated or not and, if it is, include a chlorine residual. Include other data/remarks if appropriate.

Sample Documentation: Check appropriate box for – NMED/Compliance/Non-compliance, Raw/Finished Water, or Split with facility.

Sample Type: Check either filtered or unfiltered water.
Preservation: Check appropriate box(es) for preservation chemicals added and temperature. If SLD is supposed to acidify a sample, like a heavy metals sample, make sure to check the "SLD to acidify" box.

Analyses Selection Lists: These boxes have drop-down menus that allow you to enter the sample analysis and the correct SLD code.

HM Analyses Selection List – Heavy Metals – inorganic chemistry

OR Analyses Selection List – Organic chemistry

RC Analyses Selection List – Radiological chemistry

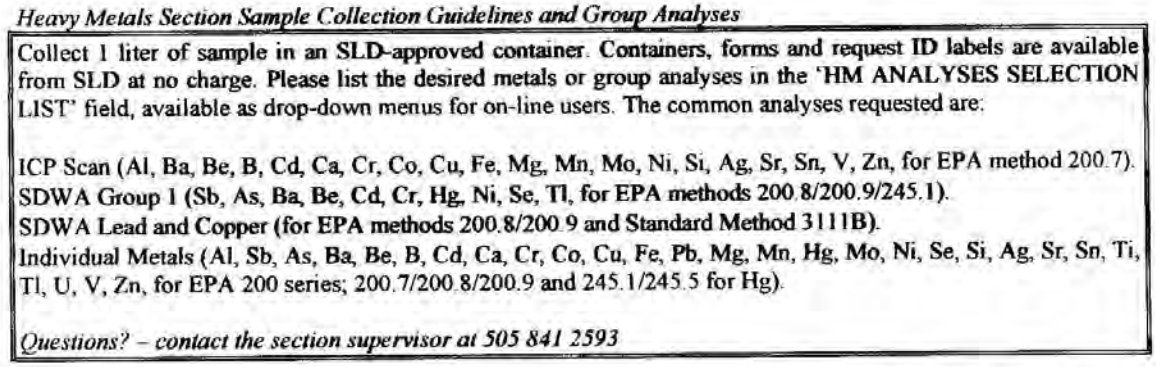
WC Analyses Selection List – Water chemistry – inorganic chemistry

Additional Analyses – Requests for additional analyses, where appropriate, can be entered here. For example, split samples for Gross alpha and/or beta in the RC section followed Uranium by ICP/MS should have the second analysis entered here.

The bottom portion of the form includes a "Chain of Custody" document. This form is not required for most samples, but must be initiated by the submitter when mandated.

GROUP ANALYSES AND SAMPLING REQUIREMENTS

The following tables have been provided to describe some of the group analyses and sampling requirements. They are grouped according to the individual sections.

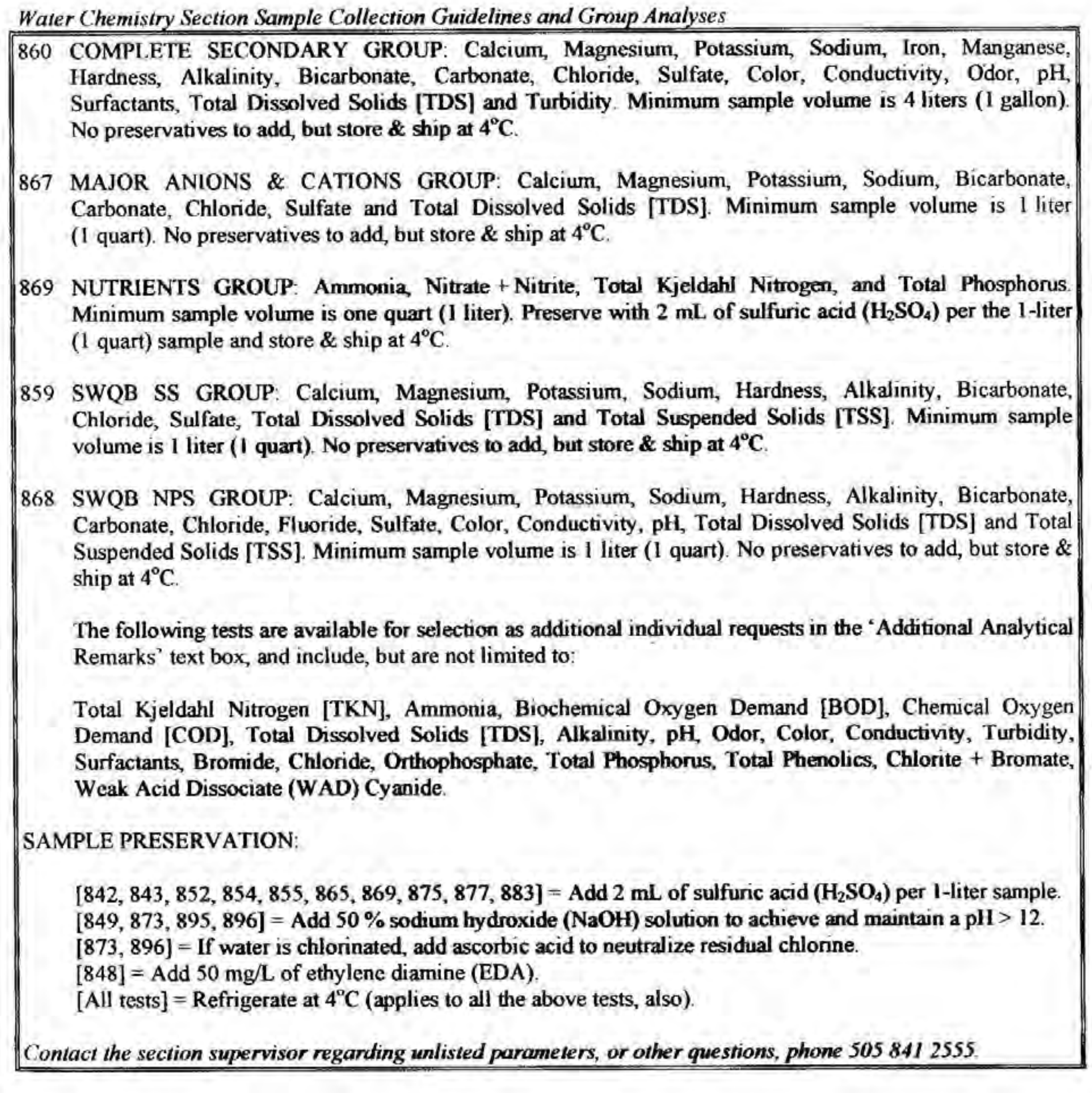


Heavy Metals Section Sample Collection Guidelines and Group Analyses

Collect 1 liter of sample in an SLD-approved container. Containers, forms and request ID labels are available from SLD at no charge. Please list the desired metals or group analyses in the 'HM ANALYSES SELECTION LIST' field, available as drop-down menus for on-line users. The common analyses requested are:

ICP Scan (Al, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Mg, Mn, Mo, Ni, Si, Ag, Sr, Sn, V, Zn, for EPA method 200.7).
SDWA Group 1 (Sb, As, Ba, Be, Cd, Cr, Hg, Ni, Se, Tl, for EPA methods 200.8/200.9/245.1).
SDWA Lead and Copper (for EPA methods 200.8/200.9 and Standard Method 3111B).
Individual Metals (Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Ni, Se, Si, Ag, Sr, Sn, Ti, Tl, U, V, Zn, for EPA 200 series; 200.7/200.8/200.9 and 245.1/245.5 for Hg).

Questions? – contact the section supervisor at 505 841 2593



Water Chemistry Section Sample Collection Guidelines and Group Analyses

860 COMPLETE SECONDARY GROUP: Calcium, Magnesium, Potassium, Sodium, Iron, Manganese, Hardness, Alkalinity, Bicarbonate, Carbonate, Chloride, Sulfate, Color, Conductivity, Odor, pH, Surfactants, Total Dissolved Solids [TDS] and Turbidity. Minimum sample volume is 4 liters (1 gallon). No preservatives to add, but store & ship at 4°C.

867 MAJOR ANIONS & CATIONS GROUP: Calcium, Magnesium, Potassium, Sodium, Bicarbonate, Carbonate, Chloride, Sulfate and Total Dissolved Solids [TDS]. Minimum sample volume is 1 liter (1 quart). No preservatives to add, but store & ship at 4°C.

869 NUTRIENTS GROUP: Ammonia, Nitrate + Nitrite, Total Kjeldahl Nitrogen, and Total Phosphorus. Minimum sample volume is one quart (1 liter). Preserve with 2 mL of sulfuric acid (H_2SO_4) per the 1-liter (1 quart) sample and store & ship at 4°C.

859 SWQB SS GROUP: Calcium, Magnesium, Potassium, Sodium, Hardness, Alkalinity, Bicarbonate, Chloride, Sulfate, Total Dissolved Solids [TDS] and Total Suspended Solids [TSS]. Minimum sample volume is 1 liter (1 quart). No preservatives to add, but store & ship at 4°C.

868 SWQB NPS GROUP: Calcium, Magnesium, Potassium, Sodium, Hardness, Alkalinity, Bicarbonate, Carbonate, Chloride, Fluoride, Sulfate, Color, Conductivity, pH, Total Dissolved Solids [TDS] and Total Suspended Solids [TSS]. Minimum sample volume is 1 liter (1 quart). No preservatives to add, but store & ship at 4°C.

The following tests are available for selection as additional individual requests in the 'Additional Analytical Remarks' text box, and include, but are not limited to:

Total Kjeldahl Nitrogen [TKN], Ammonia, Biochemical Oxygen Demand [BOD], Chemical Oxygen Demand [COD], Total Dissolved Solids [TDS], Alkalinity, pH, Odor, Color, Conductivity, Turbidity, Surfactants, Bromide, Chloride, Orthophosphate, Total Phosphorus, Total Phenolics, Chlorite + Bromate, Weak Acid Dissociate (WAD) Cyanide.

SAMPLE PRESERVATION:

[842, 843, 852, 854, 855, 865, 869, 875, 877, 883] = Add 2 mL of sulfuric acid (H_2SO_4) per 1-liter sample.
[849, 873, 895, 896] = Add 50 % sodium hydroxide (NaOH) solution to achieve and maintain a pH > 12.
[873, 896] = If water is chlorinated, add ascorbic acid to neutralize residual chlorine.
[848] = Add 50 mg/L of ethylene diamine (EDA).
[All tests] = Refrigerate at 4°C (applies to all the above tests, also).

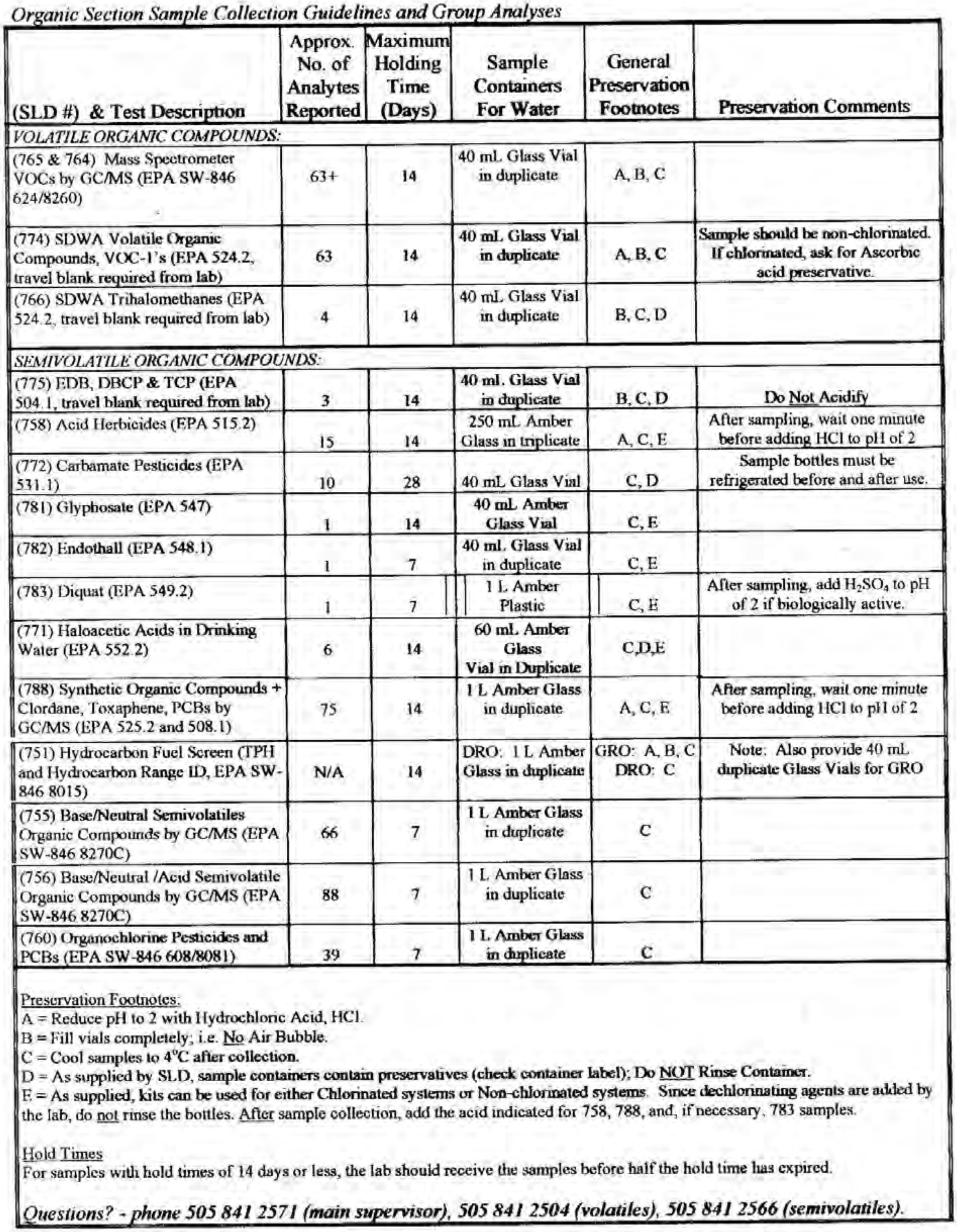
Contact the section supervisor regarding unlisted parameters, or other questions, phone 505 841 2555.

Water Chemistry Section Sample Collection Guidelines - continued

SLD ANALYSIS NAME	METHOD REFERENCE (EPA unless noted)	MDL$_A$ CONC. VALUE (mg/l)	HOLDING TIME	SAMPLE VOLUME REQUIRED	SAMPLE VESSEL	PRESERVATIVE
851 Alkalinity	310.1	2.5	14 days	100 ml	Plastic/glass	Cool 4 °C
875 Ammonia (N)	350.1 modified	0.10	28 days	100 ml	Plastic/glass	H_2SO_4 to pH < 2, cool 4 °C
851 Bicarbonate	310.1	3.1	14 days	100 ml	Plastic/glass	Cool 4 °C
889 biochemical oxygen demand BOD	405.1	2.0	48 hours	1 liter	Plastic/glass	Cool 4 °C
841Bromide	300.1 Part A	0.01	28 days	100 ml	Plastic/glass	Cool 4 °C
847 Calcium	200.7	1.0	6 months	100 ml	Plastic/glass	Cool 4 °C
842 COD (chemical oxygen demand)	HACH	5.0	28 days	500 ml	Plastic/glass	H_2SO_4 to pH < 2, cool 4 °C
848 Chlorite/bromate	300.1 part B		28 days	100 ml	Plastic/glass	Cool 4 °C
866 Chloride	300.1 Part A	5.0	28 days	100 ml	Plastic/glass	Cool 4 °C
881 Color	110.2	5 cu	48 hours	100 ml	Plastic bottle	Cool 4 °C
882 Conductance	120.1	0.1 µmhos	28 days	100ml	Plastic bottle	Cool 4 °C
895 Cyanide, free	Standard Methods 4500CN-F	0.10	14 days	100ml	Plastic bottle	Cool 4 °C
873 Cyanide, total	335.4	0.005	14 days	1 liter	Plastic cubitainer	NaOH to pH > 12, cool 4 °C
861 Fluoride	340.2, SM4500-F	0.10	28 days	100ml	Plastic bottle	Cool 4 °C
879 Hardness	200.7	1.0	6 months	1 liter	Plastic cubitainer	Cool 4 °C
846 Iron	200.7	0.10	6 months	1 liter	Plastic cubitainer	Cool 4 °C
847 Magnesium	200.7	1.0	6 months	1 liter	Plastic cubitainer	Cool 4 °C
846 Manganese	200.7	0.05	6 months	1 liter	Plastic cubitainer	Cool 4 °C
854 Nitrate + nitrite	353.2	0.1	28 days	100 ml	Plastic bottle	H_2SO_4 to pH < 2, cool 4 °C
871 Nitrite*	353.2	0.1	48 hours**	100ml	Plastic bottle	Cool 4 °C
898 Odor	SLD screen	1 odor unit	24 hours	1 liter	Plastic cubitainer	Cool 4 °C
883 Oil & grease	413.1 modified	5.0	28 days	1 liter	Amber glass bottle	H_2SO_4 to pH < 2, cool 4 °C
876 Orthophosphate*	365.1	0.03	48 hours**	1 liter	Plastic cubitainer	Cool 4 °C
878 pH	150.1/310.1	± 0.2 pH units	analyzed in field	1 liter	Plastic or glass	Cool 4 °C
843 Phenolics, total	9065A	0.005	28 days	1 liter	Amber glass bottle	H_2SO_4 to pH < 2, cool 4 °C
877 Phosphorus, total	365.4	0.03	28 days	1 liter	Plastic cubitainer	H_2SO_4 to pH < 2, cool 4 °C
847 Potassium	200.7	5.0	6 months	1 liter	Plastic cubitainer	Cool 4 °C
847 Sodium	200.7	5.0	6 months	1 liter	Plastic cubitainer	Cool 4 °C
887 Sulfate	300.1 Part B	10.0	28 days	1 liter	Plastic cubitainer	Cool 4 °C
890 Surfactants (MBAS)	425.1	0.05	48 hours	1 liter	Plastic cubitainer	Cool 4 °C
891 total dissolved solids TDS	160.1	3.0	7 days	1 liter	Plastic cubitainer	Cool 4 °C
872 TKN (total Kjeldahl nitrogen)	351.2	0.1	0.10	0.13	Plastic cubitainer	H_2SO_4 to pH < 2, cool 4 °C
865 TOC (total organic carbon)	415.1	2.0	28 days	2.1	Plastic cubitainer	H_2SO_4 to pH < 2, cool 4 °C
893 total suspended solids TSS	160.2	3.0	7 days	1 liter	Plastic cubitainer	Cool 4 °C
884 Turbidity	180.1	0.1	48 hours	1 liter	Plastic cubitainer	Cool 4 °C

* Note – please allow at least 50% of the published hold time for laboratory analysis time.

** These are the recommended times with no preservative. For samples with hold times less than 48 hours, 5 days advance notice is normally required.



Organic Section Sample Collection Guidelines and Group Analyses

(SLD #) & Test Description	Approx. No. of Analytes Reported	Maximum Holding Time (Days)	Sample Containers For Water	General Preservation Footnotes	Preservation Comments
VOLATILE ORGANIC COMPOUNDS:					
(765 & 764) Mass Spectrometer VOCs by GC/MS (EPA SW-846 624/8260)	63+	14	40 mL Glass Vial in duplicate	A, B, C	
(774) SDWA Volatile Organic Compounds, VOC-1's (EPA 524.2, travel blank required from lab)	63	14	40 mL Glass Vial in duplicate	A, B, C	Sample should be non-chlorinated. If chlorinated, ask for Ascorbic acid preservative.
(766) SDWA Trihalomethanes (EPA 524.2, travel blank required from lab)	4	14	40 mL Glass Vial in duplicate	B, C, D	
SEMIVOLATILE ORGANIC COMPOUNDS:					
(775) EDB, DBCP & TCP (EPA 504.1, travel blank required from lab)	3	14	40 ml. Glass Vial in duplicate	B, C, D	Do <u>Not</u> Acidify
(758) Acid Herbicides (EPA 515.2)	15	14	250 mL Amber Glass in triplicate	A, C, E	After sampling, wait one minute before adding HCl to pH of 2
(772) Carbamate Pesticides (EPA 531.1)	10	28	40 mL Glass Vial	C, D	Sample bottles must be refrigerated before and after use.
(781) Glyphosate (EPA 547)	1	14	40 mL Amber Glass Vial	C, E	
(782) Endothall (EPA 548.1)	1	7	40 ml. Glass Vial in duplicate	C, E	
(783) Diquat (EPA 549.2)	1	7	1 L Amber Plastic	C, E	After sampling, add H_2SO_4 to pH of 2 if biologically active.
(771) Haloacetic Acids in Drinking Water (EPA 552.2)	6	14	60 mL Amber Glass Vial in Duplicate	C,D,E	
(788) Synthetic Organic Compounds + Clordane, Toxaphene, PCBs by GC/MS (EPA 525.2 and 508.1)	75	14	1 L Amber Glass in duplicate	A, C, E	After sampling, wait one minute before adding HCl to pH of 2
(751) Hydrocarbon Fuel Screen (TPH and Hydrocarbon Range ID, EPA SW-846 8015)	N/A	14	DRO: 1 L Amber Glass in duplicate	GRO: A, B, C DRO: C	Note: Also provide 40 mL duplicate Glass Vials for GRO
(755) Base/Neutral Semivolatiles Organic Compounds by GC/MS (EPA SW-846 8270C)	66	7	1 L Amber Glass in duplicate	C	
(756) Base/Neutral /Acid Semivolatile Organic Compounds by GC/MS (EPA SW-846 8270C)	88	7	1 L Amber Glass in duplicate	C	
(760) Organochlorine Pesticides and PCBs (EPA SW-846 608/8081)	39	7	1 L Amber Glass in duplicate	C	

<u>Preservation Footnotes:</u>
A = Reduce pH to 2 with Hydrochloric Acid, HCl.
B = Fill vials completely; i.e. <u>No</u> Air Bubble.
C = Cool samples to 4°C after collection.
D = As supplied by SLD, sample containers contain preservatives (check container label); Do <u>NOT</u> Rinse Container.
E = As supplied, kits can be used for either Chlorinated systems or Non-chlorinated systems. Since dechlorinating agents are added by the lab, do <u>not</u> rinse the bottles. <u>After</u> sample collection, add the acid indicated for 758, 788, and, if necessary, 783 samples.

<u>Hold Times</u>
For samples with hold times of 14 days or less, the lab should receive the samples before half the hold time has expired.

Questions? - phone 505 841 2571 (main supervisor), 505 841 2504 (volatiles), 505 841 2566 (semivolatiles).

RADIOLOGICAL SECTION GROUP ANALYSES

801	2003 SDWA sequential w/o Radium 228 (EPA 900.0/903.1 etc.)
803	2003 SDWA sequential with Radium 228 (EPA 900.0/903.1/904.0 etc.)
811	Gross alpha and/or beta (EPA 900.0)
812	Radium – 226 (EPA 903.1)
813	Radium – 228 (EPA 904.0)
814	Uranium – 234/238 (SM 7500U-C)
834	Radon - 222 in water by liquid scintillation (EPA 913.0)
844	Gamma Scan (EPA 901.1)
933	Uranium by ICP/MS (EPA 200.8)
	New Radiological Rule 4-combo – (Gross alpha/beta, Radium 226, Radium 228, Uranium by ICP/MS)
	3-Combination – (Gross alpha/beta, Radium 226, Radium 228)
	2-Combniation – (Radium 226, Radium 228)

For the 801 request, the gross alpha will measured. If the gross alpha U-nat referenced is not ≤ 3.0 pCi/L, or Detection Limit ≥ 1.0, the Radium – 226 will be measured. If the gross alpha is ≥ 7.5 pCi/L, the U-mass will be measured. When U-mass*0.67 subtracted from the gross alpha is ≥ 7.5, a U – 234/8 analysis will be done unless “No U - 234/8” is entered in the “Additional Analyses” text box.

Note: Radium – 226 will no longer trigger a Radium – 228 analysis. An 803 request will include the 801 flow and a Radium – 228 analysis. If only Radium – 228 is desired, select the 813 request. This will only require a 1-gallon sample. If only a U-mass is desired, submit as an RC sample, and select the 933 Uranium by ICP/MS test.

STUDY QUESTIONS

1. Which samples currently require chain of custody documentation?

2. What types of analyses does the water chemistry section run?

3. What additional information is required on the microbiological request form for repeat samples?

4. Which sections of the unified sample request form have drop-down menus?

SAMPLE TEST QUESTIONS

1. Which of the following numbers might be a system identification number?

   A. 2634-208
   B. NM35101-07
   C. 912-44-0932
   D. 12-041

2. Some sample kits use one form for multiple analyses.

   A. True
   B. False

3. The unified sample request form cannot be used for which of these analyses?

   A. Organic analyses
   B. Radiological analyses
   C. Microbiological analyses
   D. Heavy metal analyses

4. Repeat microbiological samples must include:

   A. Red evidentiary seal tape
   B. Chain of custody
   C. Positive sample reference number in request form
   D. All of the above

APPENDICES

CHEMICAL & RADIOLOGICAL BASELINE MONITORING OF DRINKING WATER

GUIDANCE FOR DEVELOPING A SAMPLE SITING PLAN FOR PUBLIC WATER SYSTEMS

GUIDELINES FOR DEVELOPING A LEAD AND COPPER SAMPLING PLAN

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CHEMICAL & RADIOLOGICAL BASELINE MONITORING OF DRINKING WATER

Chemical Monitoring

For inorganic chemicals, monitoring frequency is dependent upon the water source and contaminant being sampled.

ALL PWS MUST BE SAMPLED WITHIN 90 DAYS OF COMING ON LINE

Inorganic chemicals

CONFIRMATION & AVERAGING REQUIRED TO DETERMINE COMPLIANCE FOR NITRATE

PUBLIC NOTICE IS REQUIRED FOR FLOURIDE IF RESULT IS > 2 mg/L and **ALL OTHER MCL EXCEEDANCES**

Sample collection frequency

Groundwater

Nitrate-- Annual (If 1 sample > 5 mg/L, 1/41y at least 1 year) All systems
No waiver
Nitrite--- 1 time only (if result is < .5 mg/L) All systems
Asbestos -- Every 9 years (1st period of cycle if no waiver) CWS & NTNCWS
Others --- Triennial - CWS & NTNCWS

Surface water

Nitrate-- Quarterly (reduced to annual if none > 5 mg/L) All systems
Nitrite--- 1 time only (if result is < .5 mg/L) All systems
Asbestos-- Every 9 years (same as groundwater system) CWS & NTNCWS
Others--- Annual - CWS & NTNCWS

A CONFIRMATION SAMPLE IS REQUIRED IF ANY MCL IS EXCEEDED

Sampling locations

Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment **except Asbestos (distribution – both distribution and source if source is vulnerable)**

Surface water systems shall take a minimum of one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point representative of each source after treatment

1 SULFATE SAMPLE FROM THE SOURCE FOR A NEW SYSTEM OR SOURCE - CWS & NTNCWS

Organic Chemicals

Monitoring frequency varies depending on system size and whether contaminants are detected during initial monitoring

Monitoring frequencies:

- SOCs: 4 consecutive quarterly samples during the first compliance period (Systems >3300 with no detect can reduce to 2 quarterly samples (2 consecutive 6 month periods) in 1 year, per compliance period) (Systems<3300 with no detect can reduce to 1 sample per compliance period) CWS & NTNCWS

- VOCs: 4 consecutive quarterly samples during the first compliance period (**Groundwater** systems can reduce to 1 annual if no detects in initial round, then 1 X 3 years after 3 consecutive years of no detects)

Confirmation sample required if a DETECT of any VOC

Detect = ≥0.5 ug/L (1/4ly sampling required if compliance & confirmation are ≥0.5 ug/L)

Sampling locations

Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment

Surface water systems shall take a minimum of one sample

- At every entry point to the distribution system after any application of treatment, OR
- In the distribution system at a point representative of each source after treatment

TTHM/HAA5s: Systems that disinfect

- Groundwater systems < 10,000 population and Surface and Ground water under the influence of surface water <500 population—One sample per plant per year taken at a point in the distribution system reflecting maximum residence time during the warmest water temperature months (May thru September)
- Groundwater ≥ 10,000 population and Surface and Ground water under the influence of surface water 500-9,999 population —One sample per plant per year taken at a point in the distribution system reflecting maximum residence time during the warmest water temperature months (May thru September) Remaining samples taken at representative locations within the distribution system
- Additionally, groundwater sources should have one sample analyzed for maximum TTHM Potential

Chlorine/Chloramines

- All systems—Same location and frequency as TCR sampling

DBP Precursors

- Conventional filtration—Monthly for total organic carbon and alkalinity

Radiological Monitoring

Monitoring frequency

- Initial sampling consists of the analysis of an annual "Field Composite Sample" (4 consecutive quarterly samples)
- Thereafter, sampling according to standard monitoring framework of once every 3 years or greater depending on detection of contaminants.

Groundwater systems shall take samples at the entry point to the distribution system which representative of each well after treatment

Surface water systems shall take a minimum of one sample at every entry point to the distribution system after any application a treatment or, in the distribution system at a point which is representative of each source after treatment

Turbidity Monitoring

Monitoring for turbidity must be accomplished on a daily basis for surface water sources and groundwater under the influence of surface water

- Sampling shall be done at representative entry points to the distribution system and according to Section 500 of the Drinking Water Regulations

Field Log Book Record

Written record used to trace possession and handling of samples from the moment of collection until shipment or delivery to the laboratory for analysis. All records should be done legibly in ink; Field records should be signed & dated

STANDARDIZED MONITORING FRAMEWORK

IOCs, SOCs, VOCs		Second Cycle									Third Cycle								
		1st Period			2nd Period			3rd Period			1st Period			2nd Period			3rd Period		
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Inorganic Contaminants (IOCs)[1]	**Groundwater (Below MCL)**																		
	Waiver[2]	*									*								
	No Waiver	*			*			*			*			*			*		
	Surface Water (Below MCL)																		
	Waiver[2]	*									*								
	No Waiver	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Groundwater and Surface Water (Above MCL)[3]																		
	Reliably and Consistently ≤ MCL for Groundwater Systems	*			*			*			*			*			*		
	Reliably and Consistently ≤ MCL for Surface Water Systems	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	> MCL or Not Reliably and Consistently ≤ MCL	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
Synthetic Organic Contaminants (SOCs)		02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
	Population >3,300 (Below Detection Limit)																		
	Waiver	X			X			X			X			X			X		
	< Detect and No Waiver	**			**			**			**			**			**		
	Population ≤ 3,300 (Below Detection Limit)																		
	Waiver	X			X			X			X			X			X		
	< Detect and No Waiver	*			*			*			*			*			*		
	Above Detection Limit																		
	Reliably and Consistently ≤ MCL[4]	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	≥ Detect or Not Reliably and Consistently ≤ MCL	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
Volatile Organic Contaminants (VOCs)		02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
	Groundwater (Below Detection Limit)																		
	< Detect, Vulnerability Assessment, and Waiver[5]	*						*						*					
	No Waiver[6]	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Surface Water (Below Detection Limit)																		
	< Detect, Vulnerability Assessment, and Waiver[7]	X			X			X			X			X			X		
	No Waiver[8]	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Above Detection Limit																		
	Reliably and Consistently < MCL[4]	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	≥ Detect or Not Reliably and Consistently ≤ MCL	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****

STANDARDIZED MONITORING FRAMEWORK

EXCEPTIONS		Second Cycle									Third Cycle								
		1st Period			2nd Period			3rd Period			1st Period			2nd Period			3rd Period		
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Nitrate	**CWSs & NTNCWSs**																		
	Surface Water with 4 Quarters of Results < 1/2 MCL[9]	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Groundwater Reliably and Consistently < MCL[9]	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	≥ 1/2 MCL	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
	TNCWSs																		
	Standard Monitoring	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Nitrite		02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
	< 1/2 MCL	#									#								
	Reliably and Consistently < MCL[9]	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	≥ 1/2 MCL or not Reliably and Consistently < MCL	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
Radionuclides		02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
	< Detection Limit	!		****				*									*		
	≥ Detection Limit but ≤ 1/2 MCL			****				*						*					
	> 1/2 MCL but ≤ MCL			****				*			*			*			*		
	> MCL			****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
Asbestos		02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
	Waiver	X			X			X			X			X			X		
	No Waiver, Reliably and Consistently ≤ MCL, or vulnerable to asbestos contamination[10]	*									*								
	> MCL	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****

Legend

- * = 1 sample at each entry point to distribution system (EPTDS).
- ** = 2 quarterly samples at each EPTDS. Samples must be taken during 1 calendar year during each 3-year compliance period.
- **** = 4 quarterly samples at each EPTDS within time frame designated by the primacy agency.
- X = No sampling required unless required by the primacy agency.
- # = Systems must monitor at a frequency specified by the primacy agency.
- ! = When allowed by the primacy agency, data collected between June 2000 and December 8, 2003 may be grandfathered to satisfy the initial monitoring requirements due in 2004 for gross alpha, radium 226/228, and uranium.

[1] Until January 22, 2006 the maximum contaminant level (MCL) for arsenic is 50 μg/L; on January 23, 2006 the MCL for arsenic becomes 10 μg/L.

[2] Based on 3 rounds of monitoring at each EPTDS with all analytical results below the MCL. Waivers are not permitted under the current arsenic requirements, however systems are eligible for arsenic waivers after January 23, 2006.

[3] A system with a sampling point result above the MCL must collect quarterly samples, at that sampling point, until the system is determined by the primacy agency to be reliably and consistently below the MCL.

[4] Samples must be taken during the quarter which previously resulted in the highest analytical result. Systems can apply for a waiver after 3 consecutive annual sampling results are below the detection limit.

[5] Groundwater systems must update their vulnerability assessments during the time the waiver is effective. Primacy agencies must re-confirm that the system is non-vulnerable within 3 years of the initial determination or the system must return to annual sampling.

[6] If all monitoring results during initial quarterly monitoring are less than the detection limit, the system can take annual samples. If after a minimum of 3 years of annual sampling with all analytical results less than the detection limit, the primacy agency can allow a system to take 1 sample during each compliance period. Systems are also eligible for a waiver.

[7] Primacy agencies must determine that a surface water system is non-vulnerable based on a vulnerability assessment during each compliance period or the system must return to annual sampling.

[8] If all monitoring results during initial quarterly monitoring are less than the detection limit, the system can take annual samples. Systems are also eligible for a waiver.

[9] Samples must be taken during the quarter which previously resulted in the highest analytical result.

[10] Systems are required to monitor for asbestos during the first 3-year compliance period of each 9-year compliance cycle. A system vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe must take 1 sample at a tap served by that pipe. A system vulnerable to asbestos contamination at the source must sample at each EPTDS.

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GUIDANCE FOR DEVELOPING A SAMPLE SITING PLAN FOR PUBLIC WATER SUPPLY SYSTEMS IN NEW MEXICO

One of the requirements of the Safe Drinking Water Act (SDWA) is that each public water supply system (PWS) has a written sample siting plan to follow when collecting water samples. This outline provides guidance for developing a plan and submitting it to the Environment Department for approval.

The sampling plan shall, at a minimum, include the following:

- A written description of the system which includes the PWS Code # of the system, the name of the system, the name, address, and phone # of the owner of the system, the name, address, and Phone # of the operator of the system if different from the owner, the population of the system or if the system is operated seasonally, indicate the months of operation during the previous year:
- A map of the water supply system showing the general layout of the system including the general location of all sources and their entry points to the distribution system, the location of treatment facilities including disinfection facilities, and the location of storage facilities. Small water supply systems such as restaurants and systems, which have only one service connection, are not required to submit a map as part of their plan.
- A written description of the sampling sites to be used for total coliform sampling which includes the address of the site, the location of the sampling tap at the site, and a reference to the site's location on a schematic diagram.
- The name of the laboratory(s) to be used for the system's microbiological analyses is also required

The plan will be reviewed based on the following criteria:

- At least one sampling site shall be chosen for each major portion and each isolated portion of the distribution system. Major portions of a distribution system include areas such as business districts, subdivision, industrial parks, etc. When identifying isolated portions of a distribution system, consideration must be given to the direction of flow and location of the water sources and storage tanks.
- All sampling sites chosen should be sampled at least every four months For example, a system is required to take one sample per month based on population; however, four sampling sites have been selected to monitor the water system. In this case, the system will take samples from one of the sites one-month and one sample from the next site the next month, continuing this rotation month by month. The result is that each site will be sampled every four months, which satisfies the criteria for sampling each site at least every four months.
- Site alternatives may be accepted within five connections up or down torn designated site. This is to allow flexibility of sample taking should a customer not be home on a particular sampling day. When submitting samples from an alternative location the sample should be labeled as alternative for site # and give the name and address of the alternative site.
- Public water systems, which collect six or more samples per month, shall collect them at regular time intervals throughout the month. For example, a system that is required to take a minimum of eight samples per month should take two samples per week.

MICROBIOLOGICAL INFORMATION FORM

New Mexico Environment Department

Drinking Water Bureau

Community Water Supply System	
Nontransient Noncommunity System **Noncommunity System**	
Season Begin Date (MM/DD)	**Season End Date (MM/DD)**

SECTION A - GENERAL INFORMATION

WSS Code#:	**Water Supply System Name:**	**Service Area Type** (See Appendix B, Table 1)	**County:**
System Location:			**System Phone#**

System Mailing Address:	**Street/P.O. Box**	**City**	**State**	**Zip Code**
Name of System Owner:			**Type of Owner:** (See Appendix B, Table 2)	**Owner Phone #:**
Owner's Mailing Address:	**Street/P.O. Box**	**City**	**State**	**Zip Code**

Population Served	**# of Connections**	System Serves Water to Public: ☐ Year Round ☐ Seasonally	If seasonally enter daily population served during each month

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.

Detail your sampling throughout the Month:

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Description of action(s) taken when compliance or repeat samples are positive:

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Information Furnished By: _______________. Date: ____________. Phone: _________.

Plan Reviewed By: ____________________. Date: ____________. Phone: _________.

Sample Site Descriptions

Site #	Address /Description	Sample Tap Location at Site

Site #	Address /Description	Sample Tap Location at Site

SAMPLE PLAN
FOR RESIDUAL DISINFECTANT MEASUREMENT AND DISINFECTION BYPRODUCTS SAMPLING

Water System Name	
Water System Number	NM 35
Water System Type	
Water Type	Ground Water
Population Served	
Disinfectant Used	
Name of Operator	
Certification Level of Operator	
Number of Microbiological Samples Required	1
Sampling Frequency	Monthly

RESIDUAL DISINFECTANT MEASUREMENT PLAN – CHLORINE & CHLORAMINES

This information should match your microbiological sampling plan

Site #	Address/Description	Sample Tap Location at Site	Sampling Frequency
#1			January, May, September
#2			February, June, October
#3			March, July, November
#4			April, August, December

DISINFECTION BYPRODUCTS (TTHMs/HAA5s) SAMPLING PLAN

Location of Maximum Residence Time:

Site #	Address/Description	Sample Tap Location at Site	Sampling Frequency
#			1 time per year

Other Locations, as needed:

Site #	Address/Description	Sample Tap Location at Site	Sampling Frequency

GUIDELINES FOR SITE SELECTION AND SAMPLING

The main objective of the lead and copper rule (LCR) is to protect the public from contaminants resulting from corrosion in the piping system. LCR requires the water served by all community and non-transient non-community public water systems to meet the "action levels" for lead and copper as measured at the consumer taps and/or provide optimum corrosion control treatment to minimize these corrosion by-products within the distribution system. If more than 10 percent (10%) of the tap water samples collected during any monitoring period contains more than 0.015 mg/L for lead and/or 1.3 mg/L for copper, the action level will have been exceeded (i.e., if the "90th percentile" lead level is greater than 0.015 mg/L or if the "90th percentile" copper level is greater than 1.3 mg/L).

Steps Needed To Complete the Lead and Copper Monitoring Requirements

A. SAMPLING SITE SELECTION

1. From the table below, determine the number of samples, based on population, your public water system must collect (use Number of Sites (Standard)):

Number of Samples		
System Size (Population Served)	**Number of Sites (Standard)**	**Number of Sites (Reduced)**
> 100,000	100	50
10,001 - 100,00	60	30
3,301 – 10,000	40	20
501 – 3,300	20	10
101 – 500	10	5
≤ 100	5	5

2. Complete the required construction materials report included with this package. (available on web site)

3. Use information gathered to complete the construction materials report to select sample sites that have the highest probability of corrosion. Tier 1 sites have the highest probability of corrosion, decreasing to Tier 2, and then Tier 3. If no "Tier" sites are available, select "Other" sites as sample sites. See chart below to determine "Tier" of sample site:

LCR Tier Structure			
Community – Has Copper Pipes with Lead Solder or Lead Pipes and/or Served By Lead Service Lines		**Non-Transient Non-Community** - Has Copper Pipes with Lead Solder or Lead Pipes and/or Served By Lead Service Lines	
Tier 1	Structure-Installed 1983 through 1985 - *Single-Family Structures* Or - *Multi-Family Structures* – Make Up More Than 20% Of Total Service Connections	Tier 1	Any Structure- Installed From 1983 through 1985
Tier 2	*Multi-Family Structures*-Installed By 1983 and After That Make Up 20% or Less Of Total Service Connections	Tier 2	Not Applicable
Tier 3	*Single Family Structures*-Installed By 1982 or Before	Tier 3	Any Structure-Installed By 1982 or Before
Other*	Structures with Other Plumbing Materials	Other*	Structures with Other Plumbing Materials

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B. SAMPLE SITING PLAN

1. Create a readable map, sketch or schematic of your distribution system. Clearly indicate the locations of the sampling sites. Be aware that it is in your best interests to select more sampling sites than strictly the minimum number required. The designation of more than the minimum number of sampling sites available will provide greater flexibility in performing additional sampling if necessary.

2. Assign each sampling site an alphanumeric identifier as a location code. The code for each sampling site must consist of three digits using letters, numbers, or a combination of both (for example: ABC, 123, or 1B3). Add the location code for each sampling site to the map or sketch.

3. Compile a listing of the sampling sites showing the location code, site address, Tier level, and a description of the site.

4. Add your seven digit public water supply identification number and the name or your public water supply system to both the listing and the plan or sketch. Submit the map or sketch and the listing of the sampling sites to the Lead and Copper Rule Manager for review.

5. Note that any future changes to the sample siting plan must be reviewed by the State and will require a written submittal of the requested change to the sample siting plan explaining the reason for the requested change and the submittal of a revised map or sketch and a revised site listing.

C. SAMPLE COLLECTION PROCEDURES

1. Collect each water sample in a one-liter bottle. (One-liter bottles can be acquired from a State-certified laboratory of your choosing.) The water shall stand motionless for at least 6 hours in the plumbing system before collection of the sample. Residential samples shall be collected from the cold-water kitchen tap or bathroom sink tap. Non-residential samples shall be collected at an interior tap from which water is typically drawn for consumption.

2. Collect the required number of samples for two consecutive six-month periods.

3. Calculate the 90th percentile as described below:

   (a) Place the results (of lead or copper) in ascending numerical order with the lowest concentration at the top of the list and highest concentration at the bottom of the list.

   (b) Multiply the number of samples x 0.9. The result is the sample that represents the 90th percentile.

   Example: 20 samples x 0.9 = 18
   Therefore, the analytical result for the 18th sample in the ascending list is the 90th percentile.

D. ACTIONS AFTER SAMPLING

If the 90th percentile for lead and/or the 90th percentile for copper are <u>at or below the action level</u> of 0.015 mg/L (lead) and/or 1.3 mg/L (copper), respectively, for both six-month periods, your water system may request reduced monitoring from the State via telephone, email, or postal mail.

If the 90th percentile for lead and/or the 90th percentile for copper <u>exceed</u> the action level of 0.015 mg/L (lead) and/or 1.3 mg/L (copper), respectively, for any six-month period, the following actions must be performed:

1. If the lead action level is exceeded, public education on lead in drinking water must be distributed within 60 days after exceedance and a copy of the distribution submitted to the State

2. Measure water quality parameters (WQPs) at the entry point after treatment and the distribution system.

3. Collect water samples at the entry point after treatment and analyze for lead and copper. (These samples are known as “Lead and Copper Source Water” samples.)

4. Within 6 months after exceedance, submit a Corrosion Control Treatment (CCT) Recommendation to the State stating your system's plans to rectify the corrosion problem.

5. If necessary, submit within 6 months after exceedance a Source Water Treatment (SOWT) recommendation to the State stating your system's plans to rectify any lead and/or copper contamination in your finished water.

Once treatment (CCT and/or SOWT) has been approved and installed, your water system shall perform follow-up monitoring by:

1. Monitoring the tap water in the distribution system for lead and copper;
2. Measure water quality parameters in the distribution system;
3. Monitor the water at the entry point after treatment for lead and copper (if necessary); and
4. Measure water quality parameters in the water at the entry point after treatment.

After two consecutive six-month periods of follow-up monitoring have been performed, your water system must submit the results (on Form 141-C2 as a summary) to the State for review and for designation of the operating ranges for acceptable corrosion control treatment. Once these ranges have been established, your water system must complete another two consecutive six-month periods of monitoring (as described in 1 through 4 above) to verify the ability of the installed treatment to meet the State-specified operating ranges.

If the lead and copper action levels are at or below the action levels, a system may request reduced monitoring from the State via telephone, email, or postal mail. However, if an action level is exceeded, the system must continue to conduct tap sampling, continue public education distribution if the lead action level is exceeded, and possibly begin a lead service line replacement program.

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