



Total Coliform Rule and Sampling for Water Systems

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NMED - Drinking Water Bureau



Drinking Water Bureau

Microbiological Issues for Water Systems

- I. Why conduct Total Coliform (TC) sampling?
 - II. Sampling Schedules/Site Sample Plans
 - III. Sample Collection Responsibility: Who's Responsible?
 - IV. Results: What Happens?
 - V. Repeat Sampling
 - VI. Violations and Public Notices
 - VII. Examples
 - VIII. Sample Collection Main Points
- Q & A



I. Why Sample for Total Coliform

Goal: To protect public from coming into contact with Waterborne Pathogens such as:

TYPHOID

PARATYPHOID (TYPES A & B)

CHOLERA

DYSENTERY

HEPATITIS

CRYPTOSPORIDIUM (Surface Systems Only)

GIARDIA (Surface Systems Only)



Coliform Group Of Bacteria

- **Total Coliform are Non-Pathogenic bacteria that are found in the intestinal tract of warm-blooded animals (including humans), air, and soil. They do not necessarily cause disease and are necessary for digestion of food.**
- **Because Coliform bacteria live longer in water, they are easier to detect by laboratory testing. They are also generally present when pathogens are present. This is the reason the Total Coliform group has been chosen as the indicator organism for potential contamination within water systems.**



Coliform Bacteria (cont'd)

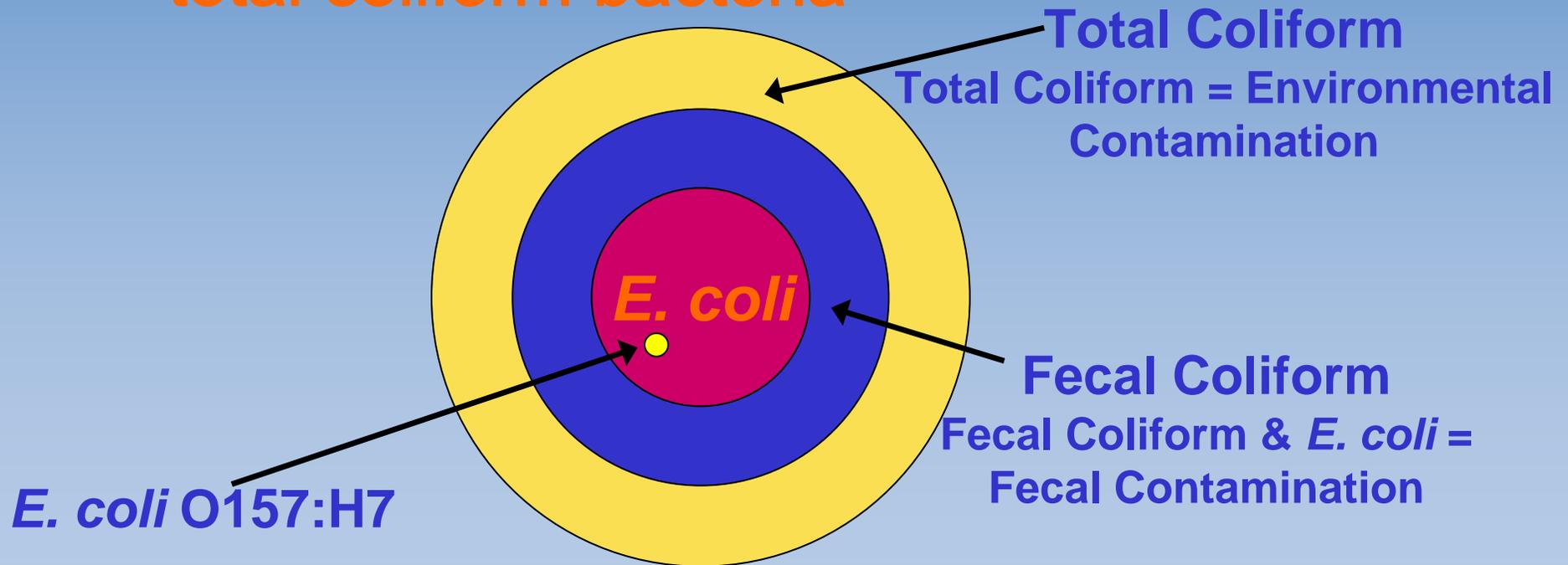
A subset of coliform bacteria known as Fecal Coliform are also found in humans and animals, but only in the waste-streams of both. Identification of Fecal Coliform within water samples is a definitive indicator that recent contamination from a waste-stream or sewage has occurred.

- E. Coli is a subset of fecal coliform, which is also only found in animal/human waste-streams or sewage. Some strains can be Deadly



Why Sample for Total Coliform (cont'd)

Goal: To protect public health from fecal coliform and *E. coli.*, through the control of total coliform bacteria



Why Sample for Total Coliform (cont'd)

TC used as an indicator

- If present conditions exist where toxic microbes might also exist
- Impractical to sample for all potential problems
- Need results quickly, TC sampling is quick, easy, and inexpensive.

Acute contaminant

- Certain microbes can produce harm with limited, short term contact



II. Required Micro Samples

Population > Number of Required Samples

25	1	6,700	8	33,000	40
1,000	2	7,600	9	41,000	50
2,500	3	8,500	10	50,000	60
3,300	4	12,900	15	59,000	70
4,100	5	17,200	20	70,000	80
4,900	6	21,500	25	83,000	90
5,800	7	25,000	30	96,000	100



Routine Monitoring: Frequency

Community Public Water System (CPWS)

Monthly

≤ 5 samples, can take at same time

> 5 samples (> 4,900 pop) regular time intervals throughout the month

Non-Transient Non-Community (NTNC)

In NM, State Bill 403, requires this type of system to be regulated as if a community



Routine Monitoring: Frequency

Transient Non-Community (TNC)

≤ 1,000 population using Groundwater,
quarterly

> 1,000 and/or SW, same as a CPWS

Any systems failing to complete required routine
and/or repeat samples results in a Non-
Sampling (Tier 3) Violation with Public Notice
required within 1 year



Routine Site Sampling Plans

All PWS must sample at sites from a state approved site sampling plan

Changes to these plans should be made anytime a significant change is made to the system

Representative of water throughout the distribution system



Routine Site Sampling Plans

Each major and each isolated portion of distribution system should be represented

Recommended to have enough sites such that each site gets sampled from every 4 months

Alternative sites within 5 connections should be identified in case original sites are unavailable for any sampling set



Sample Sites to Consider

- Immediately after leaving treatment plant.
- After all reservoirs.
- Points equally distributed throughout the system.
- Areas of potential cross connection.
- Old or deteriorating pipe.
- Low pressure zones.
- Particularly Hospitals, Schools, and Retirement Communities.



III. Sample Collection Responsibilities

ALL PUBLIC WATER SYSTEMS ARE:

1. RESPONSIBLE FOR COLLECTING ALL REQUIRED COLIFORM MONITORING SAMPLES
2. FOR KNOWING AND ADHERING TO THE COLIFORM MONITORING REQUIREMENTS SET FORTH IN CFR SUBPART C 141.21
3. ANY ADDITIONAL REQUIREMENTS SET FORTH IN TITLE 20, CHAPTER 7, PART 10 NMAC.



IV. Results: What Happens?

When all samples are negative (or absent “-”) for total coliform; the water system is in compliance for that particular monitoring period; and no further sampling is required.



When Sample Is Positive

When a sample is positive (or present “+”) for TC; the Lab will conduct either a test for Fecal Coliform or E. coli.

Within 24 hours of being notified of TC+, system will need to collect “Repeat” samples and in most cases increase the sampling done the next month.



V. Repeat Samples

If any samples of a repeat set is “+” and the # of “TC+” is $<$ MCL, than another set of 3 repeats must be taken for each positive repeat within 24 hours.

This sampling process continues until all samples from all sets are “TC-” or MCL has been exceeded.



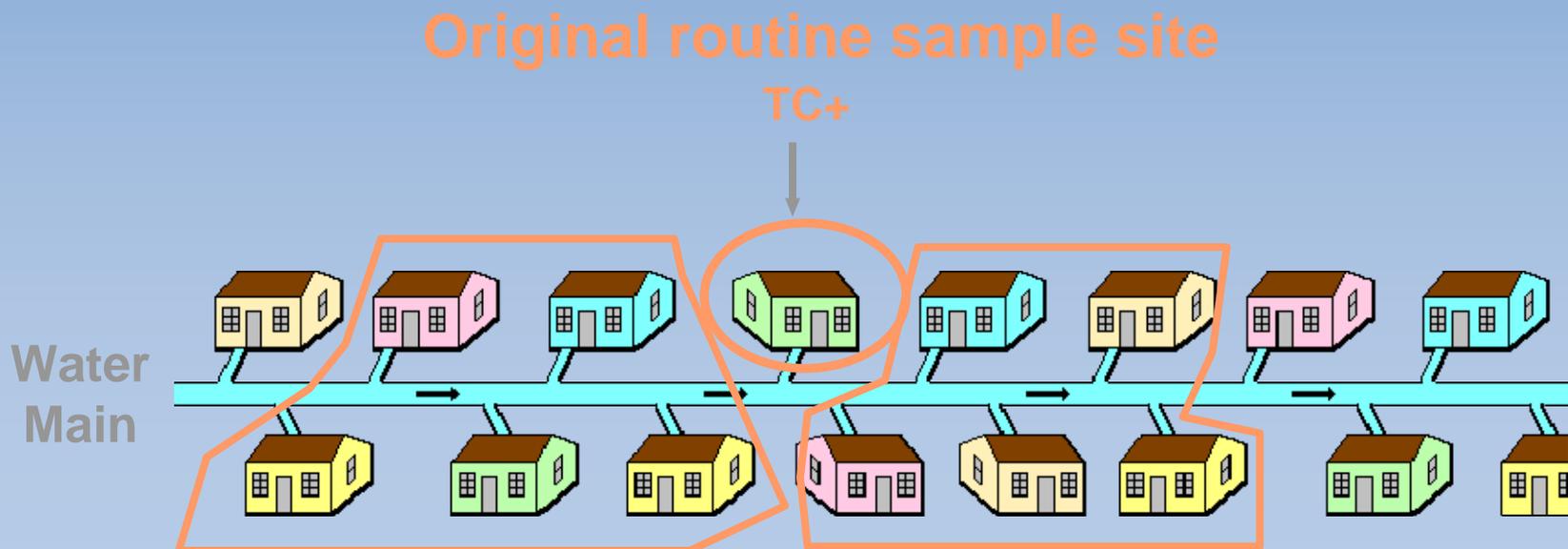
Repeat Samples (cont'd)

- Repeats are collected from original “+” site, upstream & downstream (both within 5 connections of original), and if required, a 4th sample from a site that could possibly help determine contamination source. This must be done for each TC+ Routine sample.



Repeat Monitoring:

# Routine	# Repeat	# Routine next month
1 or Fewer	4	5
2, 3, or 4	3	5
5 or More	3	Normal Schedule



GW Monitoring

In addition to Repeat sampling, starting Dec 1, 2009, all water systems (that have not been 4-log approved) and are served by any groundwater sources; will have to conduct Ground Water Monitoring at all active GW sources within their system. This means that an E. Coli sample must be collected from each GW source for each TC+ Routine [CFR Subpart S 141.402]



VI. Violations & Public Notices

There are 6 violations under the TCR Rule:

1. Code 21 Acute violation (Tier 1 PN)
2. Code 22 MCL exceedance (Tier 2 PN)
The remaining 4 are all M&R violations where M = Non-Sampling (NS) and R = reporting [141.31(a)], all are Tier 3 PN
3. Code 23 Major NS - failure to collect all routines
4. Code 24 Minor NS - collected only some of the routines
5. Code 25 Major NS – failure to collect all required repeats
6. Code 26 Minor NS - collected only some of the repeats



Acute MCL Violation

An Acute MCL (Tier 1) Violation with public notice required within 24 hours if ANY One sample is:

	Routine		Any Repeat	
	TC	FC/EC	TC	FC/EC
Case 1	“+”	“-”	“+”	“+”
Case 2	“+”	“+”	“+”	“-”



Acute MCL Violation

After an Acute MCL Violation

Determination made about Boil Advisory

Consumers given public notice within 24 hrs

System should determine cause of contamination, fix problem, then thoroughly disinfect (shock) and flush system



MCL Violation

Monthly/Quarterly MCL Violations

# Samples	# TC Positives for MCL Violation
0 – 39	2
> 39	> 5.0 % of samples (40-3, 60-4)

All routine and repeat “TC+” samples are added together to determine compliance

If # of TC + samples meets the above and no “TC+” for Fecal Coliform or E. Coli are present; then Tier 2 violation (Public Notice within a month)



MCL Violation (cont'd)

After a MCL Violation

System should determine cause of contamination, fix problem, then thoroughly disinfect (shock) and flush system

Set of “Special” micro samples taken to determine effectiveness of cleaning system

Oversight can take monitoring samples to help in this effort



Special Samples

Special sampling sets should be taken:

- Seasonal systems before they reopen system.
- New sources before being brought on line.
- On all projects before being brought on line.
- On all lines after breaks/repairs.
- After any shock chlorination to see if procedures were effective.



Public Notice of Drinking Water Violations

Severity of violations are divided into three tiers for these notices

Tier 1 – significant potential to have serious adverse effect to human health with short term exposure (immediate, within 24 hours)

Tier 2 – potential to have serious adverse effect to human health (soon, within 30 days)

Tier 3 – all other violations not included in Tiers 1 or 2 (within 1 year, can be done in CCR)



Public Notice Requirements

To keep consumers of PWS informed, systems must provide notice when violations occur

Violations include:

- Failure to comply with MCL

- Failure to perform water quality monitoring (total coliform sampling)

Wording of notices is dictated by SDWA



PN Requirements (cont'd)

All notices must include:

1. A description of the violation that occurred.
2. When the violation occurred.
3. Potential health effects.
4. The population at risk.
5. Whether alternate water supplies need to be used.
6. Actions consumers should take.



PN Requirements (cont'd)

All notices must include:

7. What is being done to correct the violation.
8. When the system expects to return to compliance.
9. Name, number, and business address for more information.
10. Standard distribution language.



VII Examples What Do We Have Here?

System has to take one sample per month

Routine

Any Repeat

TC FC/EC

TC FC/EC

Case 1 “+” “-”

“-” “-”

No violation (5 samples next month)



Examples (cont'd)

What Do We Have Here?

System has to take one sample per month

Routine

Any Repeat

TC FC/EC

TC FC/EC

Case 2 “+” “+”

“-” “-”

No violation (5 samples next month)



Examples (cont'd)

What Do We Have Here?

System has to take one sample per month

Routine

Any Repeat

TC FC/EC

TC FC/EC

Case 3 No samples

No samples

Non-Sampling violation (No change in # of samples next month)



Examples (cont'd)

What Do We Have Here?

System has to take one sample per month

Routine

Any Repeat

TC FC/EC

TC FC/EC

Case 4

“+”

“-”

“-”

“-”

Only 3 repeats taken

Non-Sampling violation (5 samples next month)



Examples (cont'd)

What Do We Have Here?

System has to take one sample per month

Routine

Any Repeat

TC FC/EC

TC FC/EC

Case 5

“+”

“+”

“+”

“-”

Tier 1 violation (5 samples next month)



VIII Sample Collection Issues

- **Complete Sample Request forms**
- **Appropriate Sample Location**
- **Communication**



Sample Request Forms

- Sample request forms begin the documentation of data collection for public drinking water quality monitoring requirements.
- It is required that forms are filled out completely in order for data to be accepted by the DWB/EPA Safe Drinking Water Information System (SDWIS) database. It is important that information uploaded to the database is accurate.
- If the database does not have data for systems by the end of their sample schedule it suggests a violation be issued for that water system.



Sample Request Forms

1. Know your water systems' ID numbers
2. Be able to look up information in Drinking Water Watch

Water System Facilities

Water System No. :	NM5531904	Federal Type :	C
Water System Name :	ANGEL FIRE SERVICES - VILLAGE OF ANGEL F	State Type :	C
Principal County Served :	COLFAX	Primary Source :	GW
Status :	A	Activity Date :	06-01-1977

State Asgn ID No.	Facility Name	Type	Activity Status
31904000	DISTRIBUTION SYSTEM	DS	A
31904017	STORAGE TANK #1	ST	A
31904012	TREATMENT PLANT #2	TP	A
31904013	TREATMENT PLANT #3	TP	A
31904014	TREATMENT PLANT #4	TP	A
31904016	TREATMENT PLANT #1	TP	A
31904020	TREATMENT PLANT #7	TP	A
31904001	WELL #1 (COFFEY #1)	WL	A
31904002	WELL #2 (COFFEY #2)	WL	A
31904009	WELL #9	WL	A
31904018			
31904019			
31904010			
31904015			
31904003			
31904004			
31904005			
31904006			
31904007			
31904008			

Return Links

- Water System Detail
- Water Systems
- Water System Search
- County Map
- Glossary**

Welcome to the Drinking Water Bureau Website

The mission of the Drinking Water Bureau is: To preserve, protect, and improve New Mexico's drinking water quality for present and future generations.

Emphasis is placed on upholding state drinking water regulations and the Federal Safe Drinking Water Act, and providing technical assistance, system oversight and community outreach.

We are available to answer your questions. To access the statewide Drinking Water Bureau directory, a description of Districts or a listing of office locations, click the CONTACT US link on the left menu. For immediate assistance, call the Drinking Water Bureau TOLL FREE at 877-654-8720.

Click any of the links on the left menu for more information on the Bureau's various programs. The WHAT'S NEW page will tell you about the latest events and resources.

To get information on any of New Mexico's Public Water Systems (PWS), go to [DRINKING WATER WATCH](#).

Go to the [EMERGENCY](#) page if you need to check for a Drinking Water Advisory, Boil Water Order or have some other emergency situation.

page last updated 02/26/2010

<http://www.nmenv.state.nm.us/dwb/>



Drinking Water Bureau

Sample Request Forms

- Water System ID number
- Facility ID Number (State Assign ID)
- Sample Point ID Number



New Mexico
ENVIRONMENT
Department

Drinking Water Bureau

Links

- Water System Facilities
- Sample Schedules
- Coliform Sample Results
- Coliform Sample Summary Results
- Lead And Copper Sample Summary Results
- Chemical Samples/Results
- Chemical Samples/Results by Analyte
- Violations/Enforcement Actions
- Site Visits
- Milestones
- Glossary

Return Links

- Water Systems
- Water System Search
- County Map

Water System Details

Water System No. : NM3535123 Federal Type : C
 Water System Name : ALGODONES WUA State Type : C
 Principal County Served : SANDOVAL Primary Source : GW
 Status : A Activity Date : 06-01-1977

Points of Contact

Name	Job Title	Type	Phone	Address	Email
BARELA, GEORGE		AC	505-771-2596	PO Box 608, ALGODONES, NM-87001	Not Available
BARELA, GEORGE		NO	505-771-2596	PO Box 608, ALGODONES, NM-87001	Not Available

Annual Operating Periods & Population Served

Start Month	Start Day	End Month	End Day	Population Type	Population Served
1	1	12	31	R	675

Service Connections

Type	Count	Meter Type	Meter Size Measure
CB	185	ME	0

Sources of Water

Name	Type Code	Status	Count	Measure

Service Areas

Name	Type Code	Status	Count	Measure

Return Links

- Water System Facilities
- Water System Detail
- Water Systems
- Water System Search
- County Map
- Glossary

Water System Facility Detail

Water System No. : NM3535123 Federal Type : C
 Water System Name : ALGODONES WUA State Type : C
 Principal County Served : SANDOVAL Primary Source : GW
 Status : A Activity Date : 06-01-1977

State Asgn ID No. : 35123003 Type : TP
 Facility Name : WELL #2 TREATMENT UNIT Activity Status : A
 Activity Reason Text : Activity Status Date : 11-21-2001

Sampling Points

Sampling Point	Location	Type
SP351230031	WELL # 2 TREATMENT UNIT	EP

Annual Operating Periods

Start Month	Start Day	End Month	End Day	Effective Begin Date	Effective End Date



Sample Request Forms

- Proper Identification numbers are required for data to upload into the DWB database
- GWR will cause sample point IDs to change

Payment Method:		<input type="checkbox"/> DWB Water Conservation Fee	<input type="checkbox"/> Water System Payment	<input type="checkbox"/> Other
Water System ID:		NM3535123		Sample Request ID:
FIELD OFFICE:	<input type="checkbox"/> Raton	<input type="checkbox"/> Albuq.	<input type="checkbox"/> Las Cruces	Water System Name: Algodones WUA
	<input type="checkbox"/> Clovis	<input type="checkbox"/> Santa Fe	<input type="checkbox"/> Other _____	Water system population is less than 1000? <input type="checkbox"/> YES <input type="checkbox"/> NO
Facility:	Well # 2 TU	Facility ID:	35123003	Sample Point ID: SP351230031
DATE COLLECTED (MM/DD/YY)		TIME COLLECTED (24 Hour Clock)		PRESERVATION
				Sample on ICE <input type="checkbox"/> YES <input type="checkbox"/> NO
Requested Analysis (check one per request)				
<input type="checkbox"/> Total Coliform & E.Coli presence/absence				
<input type="checkbox"/> E.Coli enumeration				
<input type="checkbox"/> Other:				
Compliance (check one)		Disinfection (check one)		Reason For Sampling
<input type="checkbox"/> TCR distribution sample		<input type="checkbox"/> NO <input type="checkbox"/> YES		<input type="checkbox"/> Routine Sample <input type="checkbox"/> NMED Monitoring Sample
<input type="checkbox"/> LT2 E coli Enumeration		Measured Chlorine residual		<input type="checkbox"/> Special Sample
<input type="checkbox"/> GWR triggered source sample		= _____ mg/L		REPEAT SAMPLES (check one & Include original sample #)
<input type="checkbox"/> Not a compliance sample		Measured as <input type="checkbox"/> Free or <input type="checkbox"/> Total		<input type="checkbox"/> Original Location <input type="checkbox"/> Up Stream <input type="checkbox"/> GWR triggered source
Type Of System (check one)		<input type="checkbox"/> Non-Community (NC or NTNC)		<input type="checkbox"/> Down Stream <input type="checkbox"/> Other Location
<input type="checkbox"/> Community		<input type="checkbox"/> Private Well		Original Request ID:

Drinking Water Bureau					
Water System Facility Detail					
Water System No. :	NM3535123	Federal Type :	C		
Water System Name :	ALGODONES WUA	State Type :	C		
Principal County Served :	SANDOVAL	Primary Source :	GW		
Status :	A	Activity Date :	06-01-1977		
State Asgn ID No. :	35123003	Type :	TP		
Facility Name :	WELL #2 TREATMENT UNIT	Activity Status :	A		
Activity Reason Text :		Activity Status Date :	11-21-2001		
Sampling Points					
Sampling Point	Location	Type			
SP351230031	WELL # 2 TREATMENT UNIT	EP			
Annual Operating Periods					
Start Month	Start Day	End Month	End Day	Effective Begin Date	Effective End Date



Sample Request Forms

- **Be sure to collect a free chlorine residual measurement and record it on the form.**
- **Understand what type of samples are required if your water system receives a positive result.**
- **Samples collected for both TCR and GWR are for the presence of total coliform and E.coli. Sample location will vary by rule.**
- **Any type of repeat sample should have an original positive sample number with it.**



Sample Request Forms

- A complete chain of custody is required for all drinking water compliance samples.
- Sample bottles should be sent from the labs with seals to protect the chain of custody.
- This ensures that the sample collector is legally responsible for the care of the sample until it is signed over to another person.

<u>A COMPLETE CHAIN OF CUSTODY IS REQUIRED FOR ALL COMPLIANCE SAMPLES:</u>					Present & Intact	Not Present	Present & Damaged
The sample identified on the container and this form was collected & transferred with an evidentiary seal:					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample Collected BY: <u>Print Name</u>	Signature	<u>Sampler/ Operator ID#</u>	Date	Time			
The sample identified on the container and this form was transferred with an evidentiary seal:					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLACED IN CARE OF: (Name of Postal Carrier)	Tracking Number		Date	Time			
The sample identified on the container and this form was transferred with an evidentiary seal:					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TQ: Print Name	Signature	Date	Time				
The sample identified on the container and this form was transferred with an evidentiary seal:					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TQ: Print Name	Signature	Date	Time				



Sample Location

- **Sample according to the sample siting plan for the water system.**
- **Use appropriate sample Id numbers to identify the sample site.**
- **Keep a log book of sample collection date, time, and location with comments.**
- **Be sure that sample containers are provided by the laboratory and kept in a closed container.**
- **Clean hands & clean tap before collection**



CHARACTERISTICS OF AN ACCEPTABLE FAUCET

- GOAL is to monitor the distribution system.
- Should be a faucet that is commonly taken for public use.
- Inspect each potential faucet to assure its suitability.

Its better to reject a poor sampling point because of the implications of a positive result.



Water taps to avoid

- Close and/or over-hanging vegetation. Leaves and branches maybe be a source of contamination. Material may fall into the sample bottle as the open bottle is held under the faucet.



Water taps to avoid



- Leaking faucets
 - Leaking faucets maintain a moist environment where contamination and microorganisms may survive and be washed into the sample bottle.



Water taps to avoid

- Water hose
 - A hose attached to a faucet will also maintain a reservoir of warm water where microorganisms may survive and be washed into the sample bottle.



Water taps to avoid

- Drinking fountains
 - Drinking fountains are a source of contamination because they may be contaminated by human contact. (either the hand or mouth)



Water taps to avoid

- Faucets with aerators
 - If they must be used, remove the aerator.
- Swivel-type faucets
 - Avoid swivel-type faucets with a common control valve for hot and cold water. These faucets may result in sampling water from the hot water heater instead of the distribution system.



Sample Location

- The GWR was implemented in December 2009.
- Water systems may be required to have sample taps installed at the source to be able to comply with this rule.
- Changes can be made to a sample siting plan based on sample collection notes and concerns.
- Attend sampler/operator certification course for full sample collection protocol.



Communication

- **Most information water system operators/sample collectors need can be found on the DWB website.**
 - **Current list of labs on contract**
<http://www.nmenv.state.nm.us/dwb/sampling/certifiedlabs.htm>
 - **Drinking water watch database**
<https://eidea.nmenv.state.nm.us/SDWIS/>
 - **Information on Operator certification**
<http://www.nmenv.state.nm.us/dwb/certification/index.htm>
 - **DWB Contact List**
http://www.nmenv.state.nm.us/dwb/contact_us/



Communication

- Utilize the lab by calling them with any questions concerning:
 - Obtaining sample containers
 - What to do with any sample collection container that they have sent
 - Sample processing and handling after collection
 - Sample transport and shipping options



Communication

- **Call the DWB Water System Specialist assigned to the system with any questions on:**
 - Sample siting Plan/ sample location
 - What to do after a positive result?
 - When is public notice required?
 - How to identify the source of the problem?
 - When should you collect “special” samples?



Questions??



Drinking Water Bureau