

NEVADA STATE PUBLIC HEALTH  
LABORATORY  
CHEMISTRY DIRECTORY OF SERVICES  
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## **CHAPTER 1**

The Nevada State Public Health Laboratory provides service to a broad base of clients. The work that is performed at the laboratory can be broken down into four major categories:

- Blood lead analysis
- Nevada Department of Environmental Protection Agency samples
- Clean Water Act samples
- Safe Drinking Water Act samples

Samples can be submitted to the laboratory for analysis for blood lead, CWA or SDWA from individuals, studies or larger groups.

## **FACILITIES**

Nevada State Public Health Laboratory is a state-of-the-art facility equipped with the latest in analytical chemistry instruments and technology. It is a secure facility, and it is the policy to allow only authorized personnel beyond the reception area, at the front entrance. It is located on the University of Nevada, Reno campus and is part of the School of Medicine-Pathology Department. A new section of the building was added and completed in 1995.

The water that is used for analysis is de-ionized water that is supplied by the large reverse osmosis system located in the glassware cleaning section of the laboratory. Milli-Q (MQ) water is supplied by filtering the de-ionized water through a series of filters; 2 deionization filters, 1 carbon filter and 1 organic extraction filter. The MQ water is available in the digestion laboratory.

There are six refrigerators in the sample receiving room. The samples are segregated by sample type and are stored independently. Samples and standards are kept in separate refrigerators.

## **INSTRUMENTATION**

Table 1 shows the instrumentation in place and operational for analysis of environmental samples. Wherever possible and cost effective, autosamplers are fitted to the instruments in order to improve efficiency and facilitate consistently accurate sample introduction to the instrumental system.

## Inorganic Laboratory

The Inorganic Laboratory performs a variety of both instrumental and wet chemistry procedures for inorganic analyses. It is divided into three sections: the Wet Chemistry Lab Area, the Metals Sample Preparation Area and Metals Analysis Room. The Wet Chemistry Lab maintains a full range of instrumentation including UV-VIS Spectrophotometers, Ion Selective potentiometers, Turbidimeters, pH Meters, Conductivity Meters, BOD incubator, Balances, Hamilton Dilutors, as well as other general and specialized preparatory equipment and glassware. The Metals Sample Preparation Area includes hot plates to digest the samples. The final dilutions and other necessary processes are done in the Wet Chemistry Lab. This room also includes the digestion units for Kjeldhal analysis and an ion selective meter to read the results for Kjeldhal and ammonia analysis. The Metals Analysis Room includes all the instrumentation needed to analyze for metals along with a Hamilton Dilutor for dilutions.

The Dionex Ion Chromatograph is located in the Volatile Laboratory and is used for inorganic analyses pertaining to USEPA method 300.0.

## Volatiles Laboratory

The Volatiles Lab analyzes samples containing volatile organic compounds by gas chromatography/mass spectrometry. This lab uses method USEPA 524.2.

**Table 5.1 - Instrumentation**

<u>TYPE</u>	<u>#</u>	<u>MANUFACTURER</u>	<u>MODEL</u>
UV/VIS SPEC	1	Thermo Spectronic	Genesys 10 Vis
	1	Milton Roy	Spectronic 501
ATOMIC ABSORPTION SPEC.	1	Cetac	M 7500
	1	Perkin Elmer	AAnalyst 100
	1	Perkin Elmer	FIMS 400
INDUCTIVELY COUPLED PLASMA	1	Thermo Jarrell Ash	61E
	1	Varian	Vista MPX

<u>TYPE</u>	<u>#</u>	<u>MANUFACTURER</u>	<u>MODEL</u>
ICP/MS	1	Varian	Ion Mirror
	1	Perkin Elmer	DRC II
	1	Hewlett Packard	4500
ION CHROMATOGRAPH	2	Dionex	DX5000
	1	Dionex	ICS 2000
GC/MS	1	Hewlett Packard	6890 Series MSD (1-P & T)
AUTO TITRATOR	1	Mantech	P-C Titrate
pH METER	3	Orion	pH/ISE 710A
	1	Fisher	Accumet 25
	2	Corning	125, 150
	1	Beckman	pHI 31
TURBIDITY METER	2	Hach	2100AN
CONDUCTIVITY METER	1	VWR	1054
	1	Amber Science	1052A
ANALYTICAL BALANCE	1	Mettler-Toledo	AG104
	1	Mettler-Toledo	AT200
	1	Mettler	HL32
BALANCE - TOP LOADER	1	Mettler	BB2400
	1	Mettler-Toledo	PB3002
	1	Mettler	P162N
	1	Ohaus	Galaxy 400

<u>TYPE</u>	<u>#</u>	<u>MANUFACTURER</u>	<u>MODEL</u>
BOD INCUBATOR			
	1	Precision Scientific	815
	1	Precision Scientific	808
REFRIGERATOR			
	4	True	TWT-27
	1	Silver King	
	2	Superior/True	T-49
	1	True	T-23
FREEZER			
	3	Beverage Air	WFT-27
<u>TYPE</u>	<u>#</u>	<u>MANUFACTURER</u>	<u>MODEL</u>
GAS FLOW PROPORTIONAL COUNTER			
	1	Tennelec	LB1000
	1	Tennelec	LB4110
OVEN			
	1	VWR	1630
	1	Blue M	Stabil Therm
	1	Shel Lab	1370FX
FURNACE			
	1	Thermolyne	62700
KJELDAHL DIGESTOR			
	1	Buchi	430
	1	Buchi	435
	2	Buchi	K-438
KJELDAHL DISTILLATION			
	1	Buchi	321
CYANIDE DIGESTOR			
	1	Kontes	Midi-Vap 2000
METALS DIGESTOR			
	2	Enviornmental Express	Hot Block

## **CHAPTER 2**

### **SAMPLE AND LABORATORY CONTAINERS**

Container specifications depend on the analytical method and constituent of interest. Production of quality analytical data requires that the collected sample is representative. Sampling procedures should adhere to the guidelines established by EPA and other regulatory agencies and be appropriate for the sample matrix and types of analytical parameters to be determined. Clients that collect their own samples can be briefed by lab staff by telephone on the proper methods of sample collection.

In general, use the following containers:

Volatile Organics:	Standard 40 mL glass screw-cap vials with Teflon-faced silicone septum.
Inorganic:	Polyethylene and/or glass bottles with screw caps for aqueous samples to be analyzed. Both unpreserved and acid/base preserved, depending on the analyte.
SOC:	Bottles are provided by the laboratory performing the analysis. They must be certified trace pure bottles.
Oil and Grease:	Glass bottles preserved with HCl.

The client is given instructions for the analysis that they have requested.

A detailed description of container specifications are given in the Sample Preservation and Holding Times section.

### **SAMPLE PRESERVATION AND HOLDING TIMES**

The Nevada State Public Health Laboratory supplies the appropriate sample containers and preservatives to a client upon request. Sample preservation prevents or retards the degradation and/or reaction of chemicals or biological activity in samples during transit and storage. Efforts to preserve the integrity of the samples are initiated at the time of sampling and continue until analyses are performed. Preservation of aqueous samples are verified prior to the preparation step for metals, cyanide, radiochem, etc. and prior to analysis for volatile organics. The container types, bottle sizes, preservatives, container closures, and holding times are shown in the Holding and Preservation Table.

The maximum time a preserved sample may be held between sample collection and analysis depends on the stability of the constituents of interest. Holding-time limitations are intended to minimize chemical changes in a sample before it is analyzed. Maximum

allowable holding times provided in the Holding and Preservation Table apply to aqueous samples when proper preservation procedures are followed. Holding times are measured from time of sample collection to time of analysis, unless otherwise specified by the method.

**Table 7.1 - Holding and Preservatives**

Constituent	Container	Storage & Preservation	Minimum Sample Quantity	Maximum Holding Time
<b>INORGANICS</b>				
Alkalinity	P,G	Cool, 4°C	200 ml	14 days
Ammonia-N	P,G	H <sub>2</sub> SO <sub>4</sub> ,pH<2,Cool,4°C	400 ml	28 days
Bicarbonate	P	Cool, 4°C	250 ml	14 days
Biochemical Oxygen Demand (BOD)	P,G	Cool, 4°C	1000 ml	48 hours
Boron	P	HNO <sub>3</sub> ,pH<2	100 ml	6 months
Chemical Oxygen Demand (COD)	P,G	H <sub>2</sub> SO <sub>4</sub> ,pH<2,Cool,4°C	100 ml	28 days
Chloride	P,G	None required	100 ml	28 days
Chlorine Residual	P,G	Cool, 4°C; protect from light	500 ml	2 hours
Color	P,G	None required	500 ml	ASAP
Conductivity	P,G	Cool, 4°C	500 ml	28 days
Cyanide	P,G	NaOH,pH>12; Cool, 4°C	500 ml	14 days
Filterable Residual (TDS)	P,G	Cool, 4°C	100 ml	7 days
Fluoride	P	None required	300 ml	28 days
Hardness, Total	P,G	HNO <sub>3</sub> ,pH<2	100 ml	6 months
MBAS	P,G	Cool, 4°C	500 ml	48 hours
Non-Filterable Residue (TSS)	P,G	Cool, 4°C	500 ml	7 days
pH	P,G	None required	50 ml	ASAP
Total Kjeldahl Nitrogen	P,G	H <sub>2</sub> SO <sub>4</sub> ,pH<2,Cool,4°C	500 ml	28 days
Nitrate, as N	P,G	W/o preservative	100 ml	48 hours
Nitrate + Nitrite, as N	P,G	H <sub>2</sub> SO <sub>4</sub> ,pH<2,Cool,4°C	100 ml	28 days
Nitrite	P,G	Cool, 4°C	100 ml	48 hours
<b>Constituent</b>	<b>Container</b>	<b>Storage &amp;</b>	<b>Minimum</b>	<b>Maximum</b>

		<b>Preservation</b>	<b>Sample Quantity</b>	<b>Holding Time</b>
Orthophosphate, as P	P,G	Filter Immediately, Cool, 4°C	100 ml	48 hours
Total Phosphorous, as P	P,G	H <sub>2</sub> SO <sub>4</sub> ,pH<2,Cool,4°C	100 ml	28 days
Sulfate	P,G	Cool, 4°C	200 ml	28 days
Turbidity	P,G	Cool, 4°C; protect from light	100 ml	48 hours
<b>METALS</b>				
Mercury	P,G	HNO <sub>3</sub> ,pH<2, Cool, 4°C	200 ml	28 days
All other metals	P	HNO <sub>3</sub> ,pH<2	200 ml	6 months
<b>RADIOCHEM</b>				
Gross Alpha/Beta	P,G	HNO <sub>3</sub> ,pH<2	500 ml	6 months
Radium-226	P,G	HNO <sub>3</sub> ,pH<2	1000 ml	6 months
Radium-228	P,G	HNO <sub>3</sub> ,pH<2	1000 ml	6 months
Radon	G	40 ml vial, no air bubbles	40 ml	72 hours
Uranium	P,G	HNO <sub>3</sub> ,pH<2	1000 ml	6 months
<b>ORGANICS</b>				
Oil and Grease	G	H <sub>2</sub> SO <sub>4</sub> ,pH<2,Cool,4°C	1000 ml	28 days
Volatile Organics	G(VOA) TFE-Septa Cap	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> if chlorinated and HCl pH<2;Cool,4°C	3/40 ml vials	14 days
EDB & DBCP	3 X 40 ml Glass Vial	100 ul Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , Cool,4°C, No Headspace	25 ml	7 days Extraction
Organohalide Pesticides/PCBs	2 X 1 liter	2.5 ml Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , Cool,4°C	1000 ml	7 days Extraction
N & P Containing Pesticides	2 X 1 liter	2.5 ml Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , Cool,4°C	1000 ml	7 days Extraction
Chlorinated Pesticides	2 X 1 liter	2.5 ml Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , Cool,4°C	1000 ml	7 days Extraction
PCB Screening	2 X 1 liter	Cool,4°C	1000 ml	14 days Extraction
Chlorinated Acids (Herbicides)	2 X 1 liter	2.5 ml Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , Cool,4°C	1000 ml	14 days Extraction
Chlorinated Acids (Herbicides)	2 X 1 liter	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> if pH<2;Cool,4°C	1000 ml	14 days Extraction
Organic Compounds (Extractable)	2 X 1 liter	10 drops Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , pH<2;Cool,4°C	1000 ml	14 days Extraction
n-Methyl Carbamates	3 X 40 ml Glass Vial	100 ul Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , pH=3 (1.2 ml MCAA),Cool,4°C	30 ml	28 days
<b>Constituent</b>	<b>Container</b>	<b>Storage &amp; Preservation</b>	<b>Minimum Sample</b>	<b>Maximum Holding Time</b>

			<b>Quantity</b>	
Glyphosate	125 L Amber Glass	300 ul Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , Cool,4°C, dark	40 ml	14 days
Endothall	1 Liter Amber Glass	2.5 ml Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> pH<2;Cool,4°C	500 ml	7 days Extract
Diquat & Paraquat	1 Liter HDPE	2.5 ml Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> pH<2	250 ml	7 days Extraction
Haloacetic Acids & Dalapon	250 ml Amber Glass	1 ml conc H <sub>2</sub> SO <sub>4</sub> , Cool,4°C, 100 mg/L NH <sub>4</sub> Cl	100 ml	14 days Extraction

**SAMPLING INSTRUCTIONS  
ROUTINE DOMESTIC**

Your kit includes the following:

1. A Nevada State Public Health Laboratory request form.
2. 1/2 gallon size container which has no preservative added.
3. One plastic baggie containing a total of two bottles with preservatives added. One bottle labeled *nitrate* and one bottle labeled *metals*.

### **PRE-COLLECTION**

Brand new wells need to be run for a minimum of 24 hours at a reasonable flow to bring the water to a consistent mineral content. Wells that have been not been used for a while need to be run a minimum of 4 hours at a slow flow to prevent deposits in well casings from distorting results. (In either case, run the water outside to avoid filling your septic tank.)

### **COLLECTION**

1. Complete the request form.
2. Fill the 1/2 gallon size container.
3. Using the water from the 1/2 gallon container fill the 3 preserved bottles. **DO NOT RINSE THE BOTTLES BEFORE FILLING.**

**All 3 of the containers must be returned to the laboratory within 3 days of the time the sample was taken with the completed NSHL request form.**

Each bottle should be labeled using a permanent marker with your name, the source address and the date the sample was taken.

**Reasons for potential sample rejection include, but are not limited to:**

- Improperly preserved samples, i.e. wrong pH, too hot, wrong or missing preservative, etc.
- Leaking sample bottles
- Insufficient sample volume submitted for requested analysis
- Incomplete/missing/or incorrectly filled out paper work
- Sample labels missing or indecipherable
- Expired or soon to expire holding times

Please make checks payable to the Board of Reagents.

### **SAMPLING INSTRUCTIONS**

## **MAILERS**

Your kit includes the following:

1. Nevada State Public Health Laboratory request form.
2. Large mail canister/or bag which includes 1 nitrate bottle and 1 metals bottle.

## **PRE-COLLECTION**

Brand new wells need to be run for a minimum of 24 hours at a reasonable flow to bring the water to a consistent mineral content. Wells that have been used consistently for a while need to be run a minimum of 4 hours at a slow flow to prevent deposits in well casings from distorting results. (In either case, run the water outside to avoid filling your septic tank.)

## **COLLECTION**

1. Fill each bottle with the water of interest. **DO NOT RINSE THE BOTTLES**

Return the sample bottles to the laboratory within 4 days of the time the sample was taken with the completed NSHL request form.

Each bottle should be labeled using a permanent marker with your name, the source address and the date the sample was taken.

### **Reasons for potential sample rejection include, but are not limited to:**

- Improperly preserved samples, i.e. wrong pH, too hot, wrong or missing preservative, etc.
- Leaking sample bottles
- Insufficient sample volume submitted for requested analysis
- Incomplete/missing/or incorrectly filled out paper work
- Sample labels missing or indecipherable
- Expired or soon to expire holding times

## **SAMPLING INSTRUCTIONS NITRATE**

Your kit includes the following:

1. Nevada State Public Health Laboratory request form.
2. 1 Sample bottle preserved with sulfuric acid.

### **PRE-COLLECTION**

Brand new wells need to be run for a minimum of 24 hours at a reasonable flow to bring the water to a consistent mineral content. Wells that have been used consistently for a while need to be run a minimum of 4 hours at a slow flow to prevent deposits in well casings from distorting results. (In either case, run the water outside to avoid filling your septic tank.)

### **COLLECTION**

1. Fill the bottle to the rim (neck) with the water of interest. **DO NOT RINSE THE BOTTLE.**

Return the sample bottle to the laboratory within 4 days of the time the sample was taken with the completed NSHL request form.

Mark the bottle using a permanent marker with your name, the source address and the date the sample was taken.

### **Reasons for potential sample rejection include, but are not limited to:**

- Improperly preserved samples, i.e. wrong pH, too hot, wrong or missing preservative, etc.
- Leaking sample bottles
- Insufficient sample volume submitted for requested analysis
- Incomplete/missing/or incorrectly filled out paper work
- Sample labels missing or indecipherable
- Expired or soon to expire holding times

### **SAMPLING INSTRUCTIONS NITRITE**

Your kit includes the following:

1. Nevada State Public Health Laboratory request form.
2. Unpreserved sample bottle

### **PRE-COLLECTION**

Brand new wells need to be run for a minimum of 24 hours at a reasonable flow to bring the water to a consistent mineral content. Wells that have been used consistently for a while need to be run a minimum of 4 hours at a slow flow to prevent deposits in well casings from distorting results. (In either case, run the water outside to avoid filling your septic tank.)

### **COLLECTION**

1. Fill the bottle with the water of interest.

Return the sample bottle to the laboratory within 30 hours of the time the sample was taken with the completed NSHL request form.

Mark the bottle using a permanent marker with you name, the source address and the date the sample was taken.

To ship the container:

1. Place water bottle in cooler.
2. Double bag ice, making sure bags are sealed tightly, and place in cooler.

**NOTE: Sample must be maintained at 2-6 degrees (refrigerate).  
DO NOT FREEZE.**

### **Reasons for potential sample rejection include, but are not limited to:**

Improperly preserved samples, i.e. wrong pH, too hot, wrong or missing preservative, etc.  
Leaking sample bottles  
Insufficient sample volume submitted for requested analysis  
Incomplete/missing/or incorrectly filled out paper work  
Sample labels missing or indecipherable  
Expired or soon to expire holding times

### **SAMPLING INSTRUCTIONS LEAD & COPPER**

Your kit includes the following:

1. Nevada State Public Health Laboratory request form.

2. Unpreserved sample bottle

### **PRE-COLLECTION**

Run the cold water tap until the water is cold. Turn off and do not use for 6 to 16 hours.

### **COLLECTION**

Collect the first draw of the water into the bottle provided. Fill to the rim (neck) of the bottle. Deliver the sample and paperwork to the lab within 7 days. (These directions are also on the bottle.)

The bottle should be labeled using a permanent marker with your name, the source address and the date the sample was taken.

### **Reasons for potential sample rejection include, but are not limited to:**

- Improperly preserved samples, i.e. wrong pH, too hot, wrong or missing preservative, etc.
- Leaking sample bottles
- Insufficient sample volume submitted for requested analysis
- Incomplete/missing/or incorrectly filled out paper work
- Sample labels missing or indecipherable
- Expired or soon to expire holding times

### **SAMPLING INSTRUCTIONS**

#### **VOCS - THM Analysis**

#### **Your kit includes the following:**

1. Three small 40 ml amber vials for each source
2. One 250 ml amber collection bottle - Contains ascorbic acid for preservation.  
Labeled as Collection bottle.

3. Two travel blanks - These stay with the kit to ensure that there is no contamination from an outside source. **DO NOT OPEN.**
4. One temperature check vial. **DO NOT OPEN.**
5. HCl dropper bottle
6. Sample data sheet - The kit date will be written on this sheet

**KIT MUST BE RETURNED TO THE LAB WITHIN 8 DAYS FROM THE SAMPLE DATE.**

Brand new wells need to be run for a minimum of 24 hours at a reasonable flow. Wells that have been used consistently for a while need to be run a minimum of 4 hours at a slow flow. In either case, run the water outside to avoid filling your septic tank.

1. Fill the 250 ml amber collection bottle with the water that is to be analyzed. **(Do not shake or agitate.)**
2. Pour the water out of the collection bottle into the three blue capped 40 ml vials. Slightly overfill the vials so that you visible see a dome at the top of the vial. When the cap is screwed on it will squeeze out the excess sample and prevent air bubbles from forming in the vials.
3. Add 2 drops of the 1:1 HCl from the dropper bottle to each 40 ml vial that you have just filled with water. Even though there is a bubble at the top of the vial the addition of the HCl will not cause the water to overflow.
4. Screw a cap on each vial.
5. With one hand hold the 40 ml vial upside down and tap it lightly on your other hand. If air bubbles surface then uncap the vial and add more of the water from the small amber bottle. **(The sample will not be analyzed if there are air bubbles in the vials.)**
6. Place the vials back into the VOC kit with ice that has been double bagged and sealed tightly plastic bags. Make sure that enough ice is used to ensure that the samples will be cool until they arrive at the laboratory.
7. The large amber collection bottle does not need be to sent back the Health Laboratory.

If you have any questions please call Nevada State Public Health Laboratory at (775) 688-1335.

**SAMPLING INSTRUCTIONS  
VOCS - THMs (continued)**

**Reasons for potential sample rejection include, but are not limited to:**

- Improperly preserved samples, i.e. wrong pH, too hot, wrong or missing preservative, etc.
- Leaking sample bottles
- Insufficient sample volume submitted for requested analysis
- Incomplete/missing/or incorrectly filled out paper work
- Sample labels missing or indecipherable
- Expired or soon to expire holding times

**SAMPLING INSTRUCTIONS**

**VOCS -**

**Your kit includes the following:**

1. Three small 40 ml amber vials for each source
2. Two travel blanks - These stay with the kit to ensure that there is no contamination from an outside source. **DO NOT OPEN.**

3. One temperature check vial. **DO NOT OPEN.**
4. HCl dropper bottle
5. Sample data sheet - The kit date will be written on this sheet

**KIT MUST BE RETURNED TO THE LAB WITHIN 8 DAYS FROM THE SAMPLE DATE.**

Brand new wells need to be run for a minimum of 24 hours at a reasonable flow. Wells that have been used consistently for a while need to be run a minimum of 4 hours at a slow flow. In either case, run the water outside to avoid filling your septic tank.

1. Fill the 40 ml vials with the water that is to be analyzed. Slightly overfill the vials so that you visible see a dome at the top of the vial. When the cap is screwed on it will squeeze out the excess sample and prevent air bubbles from forming in the vials.
3. Add 2 drops of the 1:1 HCl from the dropper bottle to each 40 ml vial that you have just filled with water. Even though there is a bubble at the top of the vial the addition of the HCl will not cause the water to overflow.
4. Screw a cap on each vial.
5. With one hand hold the 40 ml vial upside down and tap it lightly on your other hand. **(The sample will not be analyzed if there are air bubbles in the vials.)**
6. Place the vials back into the VOC kit with ice that has been double bagged and sealed tightly in plastic bags. Make sure that enough ice is used to ensure that the samples will be cool until they arrive at the laboratory.

If you have any questions please call Nevada State Public Health Laboratory at (775) 688-1335.

**Reasons for potential sample rejection include, but are not limited to:**

- Improperly preserved samples, i.e. wrong pH, too hot, wrong or missing preservative, etc.
- Leaking sample bottles
- Insufficient sample volume submitted for requested analysis
- Incomplete/missing/or incorrectly filled out paper work
- Sample labels missing or indecipherable
- Expired or soon to expire holding times

**SAMPLING INSTRUCTIONS  
SOCS**

Your kit includes:

1. Nevada State Public Health Laboratory request form.

2. 10 collection bottles.

### **PRE-COLLECTION**

Make sure that a brand new well has been run for a minimum of 24 hours at a reasonable flow. Wells that have been used consistently for a while need to be run a minimum of 4 hours at a slow flow. (In either case, run the water outside to avoid filling your septic tank.)

### **COLLECTION**

The bottles for SOCs have preservatives in them so **DO NOT RINSE THE BOTTLES**. Completely fill each bottle with the water of interest.

It is essential that the bottles be kept cool, so dump a 5 lb bag of ice inside a larger bag (garbage bag), make sure to tie the end, and place on top of bottles.

**DO NOT FREEZE.**

The sample bottles must be returned to the laboratory within 48 hours of the time the samples were taken with the complete NSHL request form.

Each bottle should be labeled using permanent marker with your name, the source address and the date the sample was taken.

### **Reasons for potential sample rejection include, but are not limited to:**

- Improperly preserved samples, i.e. wrong pH, too hot, wrong or missing preservative, etc.
- Leaking sample bottles
- Insufficient sample volume submitted for requested analysis
- Incomplete/missing/or incorrectly filled out paper work
- Sample labels missing or indecipherable
- Expired or soon to expire holding times

### **SAMPLING INSTRUCTIONS**

#### **RADON**

#### **Your kit includes the following:**

1. A Nevada State Health Lab request form.

2. Two small 40 ml amber vials for each source

## **SAMPLE MUST BE RETURNED TO THE LAB WITHIN 24 HOURS OF COLLECTION**

### **DO NOT COLLECT WATER FOR RADON ON A FRIDAY**

Brand new wells need to be run for a minimum of 24 hours at a reasonable flow. Wells that have been used consistently for a while need to be run a minimum of 4 hours at a slow flow. In either case, run the water outside to avoid filling your septic tank.

1. Slightly overfill the vials so that you visible see a dome at the top of the vial. When the cap is screwed on it will squeeze out the excess sample and prevent air bubbles from forming in the vials.
2. Screw a cap on each vial.
3. With one hand hold the vial upside down and tap it lightly on your other hand. If air bubbles surface then uncap the vial and add more water. **(The sample will not be analyzed if there are air bubbles in the vials.)**
4. Place the vials on ice for transport to the laboratory. Make sure that enough ice is used to ensure that the samples will be cool until they arrive at the laboratory.

If you have any questions please call Nevada State Public Health Laboratory at (775) 688-1335.

### **Reasons for potential sample rejection include, but are not limited to:**

- Improperly preserved samples, i.e. wrong pH, too hot, wrong or missing preservative, etc.
- Leaking sample bottles
- Insufficient sample volume submitted for requested analysis
- Incomplete/missing/or incorrectly filled out paper work
- Sample labels missing or indecipherable
- Expired or soon to expire holding times

## **CHAPTER 3**

### **REPORTING LIMITS**

The reporting limit that the Nevada State Public Health Laboratory uses is based on the evaluation of the Practical Quantitation Limits (PQLs) for each method of interest. The PQL is the lowest concentration reliably achievable within limits of precision and accuracy, using a given method.

The PQL can be estimated from the MDL by multiplying the MDL by five (5) to ten (10). Five (or some lower multiplier) is used when a multiplier of ten would cause the PQL to be higher than the lowest calibration standard or for drinking water, the maximum contaminant limit (MCL). The MCL is the enforceable health goal defined as the “maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety”.

Reporting limits are reviewed to ensure that the PQL does not exceed the concentration needs of the client.

**PLEASE NOTE: THE FOLLOWING REPORTING LIMITS APPLY ONLY TO SAMPLES NOT REQUIRING DILUTION. SAMPLES REQUIRING DILUTION WILL HAVE HIGHER REPORTING LIMITS.**

The following table is a list of reporting limits for drinking water samples.

**Reporting Limits**

<b>Routine Domestic:</b>			
<b>Analyte</b>	<b>Concentration</b>	<b>Units</b>	<b>Method</b>
TDS	25	ppm	SM 2540 C 19th Ed
Calcium	5	ppm	USEPA 200.7
Magnesium	5	ppm	USEPA 200.7
Sodium	5	ppm	USEPA 200.7
Potassium	5	ppm	USEPA 200.7
Sulfate	5	ppm	USEPA 300.0
Chloride	5	ppm	USEPA 300.0
Nitrate as N	0.5	ppm	USEPA 300.0
<b>Analyte</b>	<b>Concentration</b>	<b>Units</b>	<b>Method</b>
Alkalinity	20	ppm	SM 2320 B 19th Ed
Fluoride	0.1	ppm	USEPA 300.0
Arsenic	0.003	ppm	USEPA 200.8

Iron	0.05	ppm	USEPA 200.7
Manganese	0.02	ppm	USEPA 200.7
Copper	0.02	ppm	USEPA 200.7
Zinc	0.05	ppm	USEPA 200.7
Barium	0.02	ppm	USEPA 200.7
Boron	0.1	ppm	USEPA 200.7
Silica	1	ppm	USEPA 200.7
Color	3	S.U.	SM 2120 C 19th Ed
Turbidity	0.4	NTU	USEPA 180.1
EC	15	umho/cm	SM 2510 19th Ed

**Trace Metals:**

	<b>Concentration</b>	<b>Units</b>	<b>Method</b>
Antimony	0.001	ppm	USEPA 200.8
Beryllium	0.001	ppm	USEPA 200.8
Cadmium	0.001	ppm	USEPA 200.8
Chromium	0.001	ppm	USEPA 200.8
Lead	0.001	ppm	USEPA 200.8
Mercury	0.0005	ppm	USEPA 245.2
Nickel	0.001	ppm	USEPA 200.8
Selenium	0.001	ppm	USEPA 200.8
Silver	0.001	ppm	USEPA 200.8
Thallium	0.0005	ppm	USEPA 200.8

**Radiochemistry:**

	<b>Concentration</b>	<b>Units</b>	<b>Method</b>
Gross Alpha	3	piC/L	USEPA 900.0
Gross Beta	3	piC/L	USEPA 900.0
Uranium	3	piC/L	USEPA 908.0 or USEPA 200.8

**Other:**

	<b>Concentration</b>	<b>Units</b>	<b>Method</b>
MBAS	0.1	ppm	SM 5540 C 19th Ed
Nitrite as N	0.01	ppm	SM 4500 NO2 B 19th Ed
Cyanide	0.005	ppm	SM 4500 CN C, E 19th Ed

**PLEASE NOTE: THE FOLLOWING REPORTING LIMITS APPLY ONLY TO SAMPLES NOT REQUIRING DILUTION. SAMPLES REQUIRING DILUTION WILL HAVE HIGHER REPORTING LIMITS.**

**Pollution Reporting limits**

<b>Routine Pollution:</b>			
<b>Analyte</b>	<b>Concentration</b>	<b>Units</b>	<b>Method</b>
TDS	25	ppm	SM 2540 C 19th Ed
TSS	10	ppm	USEPA 160.2
E.C.	15	umho/cm	SM 2510 19th Ed
Turbidity	0.4	NTU	USEPA 180.1
Color	3	S.U.	SM 2120 C 19th Ed
Alkalinity	20	ppm	SM 2320 B 19th Ed
Kjeldahl-N	0.2	ppm	SM 4500 N B, NH3 B, F 19th Ed
Nitrate	0.1	ppm	USEPA 300.0
Nitrite	0.01	ppm	SM 4500 NO2 B 19th Ed
Ammonia-N	0.1	ppm	SM 4500 NH3 F 19th Ed
Ortho-P	0.01	ppm	SM 4500 P E 19th Ed
Total-P	0.01	ppm	SM 4500 P E 19th Ed
Chloride	5	ppm	USEPA 300.0
COD	10	ppm	SM 2120 C 19th Ed
BOD	2	ppm	SM 2510 19th Ed
Sulfate	5	ppm	USEPA 300.0
<b>Trace Metals:</b>			
	<b>Concentration</b>	<b>Units</b>	<b>Method</b>
Cadmium	0.001	ppm	USEPA 200.8
Chromium	0.002	ppm	USEPA 200.8
Copper	0.02	ppm	USEPA 200.7
Iron	0.05	ppm	USEPA 200.7
Lead	0.002	ppm	USEPA 200.8
Mercury	0.0005	ppm	USEPA 245.2
Selenium	0.002	ppm	USEPA 200.8
Zinc	0.05	ppm	USEPA 200.7
Arsenic	0.003	ppm	USEPA 200.8
<b>Analyte</b>	<b>Concentration</b>	<b>Units</b>	<b>Method</b>
Boron	0.1	ppm	USEPA 200.7
Hardness	33	ppm	USEPA 200.7

Calcium	5	ppm	USEPA 200.7
Magnesium	5	ppm	USEPA 200.7
Sodium	5	ppm	USEPA 200.7

**PLEASE NOTE: THE FOLLOWING REPORTING LIMITS APPLY ONLY TO SAMPLES NOT REQUIRING DILUTION. SAMPLES REQUIRING DILUTION WILL HAVE HIGHER REPORTING LIMITS.**

The following table is a list of reporting limits for volatile organic compounds.

**Reporting Limits  
Volatile Organic Compounds  
Method: USEPA 524.2**

<b>Regulated Volatiles</b>			<b>Unregulated Volatiles</b>		
	<b>Concentration</b>	<b>Units</b>		<b>Concentration</b>	<b>Units</b>
Vinyl Chloride	0.0005	ppm	Dichlorodifluoromethane	0.0005	ppm
Benzene	0.0005	ppm	Chloromethane	0.0005	ppm
Carbon Tetrachloride	0.0005	ppm	Bromomethane	0.0005	ppm
1,2-Dichloroethane	0.0005	ppm	Chloroethane	0.0005	ppm
Trichloroethylene	0.0005	ppm	Trichlorofluoromethane	0.0005	ppm
1,4-Dichlorobenzene	0.0005	ppm	1,1-Dichloroethane	0.0005	ppm
1,1-Dichloroethylene	0.0005	ppm	2,2-Dichloropropane	0.0005	ppm
1,1,1-Trichloroethane	0.0005	ppm	Bromochloromethane	0.0005	ppm
cis-1,2-Dichloroethylene	0.0005	ppm	1,1-Dichloropropene	0.0005	ppm
Dichloromethane	0.0005	ppm	Dibromomethane	0.0005	ppm
1,1,2-Trichloroethane	0.0005	ppm	cis-1,3-Dichloropropene	0.0005	ppm
1,2-Dichloropropane	0.0005	ppm	trans-1,3-Dichloropropene	0.0005	ppm
Ethylbenzene	0.0005	ppm	1,3-Dichloropropane	0.0005	ppm
Monochlorobenzene	0.0005	ppm	1,2-Dibromoethane	0.0005	ppm
1,2-Dichlorobenzene	0.0005	ppm	1,1,1,2-Tetrachloroethane	0.0005	ppm
Styrene	0.0005	ppm	Isopropylbenzene	0.0005	ppm
Tetrachloroethylene	0.0005	ppm	Bromobenzene	0.0005	ppm
Toluene	0.0005	ppm	1,1,2,2-Tetrachloroethane	0.0005	ppm
trans-1,2-Dichloroethylene	0.0005	ppm	1,2,3-Trichloropropane	0.0005	ppm
Xylenes(total)	0.0005	ppm	n-Propylbenzene	0.0005	ppm
1,2,4-Trichlorobenzene	0.0005	ppm	2-Chlorotoluene	0.0005	ppm
			4-Chlorotoluene	0.0005	ppm

			1,3,5-Trimethylbenzene	0.0005	ppm
<b>Trihalomethanes:</b>			1,2,4-Trimethylbenzene	0.0005	ppm
Chloroform	0.0005	ppm	sec-Butylbenzene	0.0005	ppm
Bromodichloromethane	0.0005	ppm	1,3-Dichlorobenzene	0.0005	ppm
Dibromochloroemethane	0.0005	ppm	4-Isopropyltoluene	0.0005	ppm
Bromoform	0.0005	ppm	n-Butylbenzene	0.0005	ppm
			Hexachlorobutadiene	0.0005	ppm
			Napthalene	0.0005	ppm
			1,2,3-Trichlorobenzene	0.0005	ppm

## CHAPTER 4

## ANALYTICAL METHODS

Methods used in sample preparation or analysis are selected to meet the specific needs and requirements of the client. The Nevada State Public Health Laboratory employs standard, officially approved analytical methods to quantify inorganic, organic, and radionuclide constituents in environmental media. The analytical methods performed are specific for drinking water, waste water, and groundwater. These methods are listed in the following Tables.

**Table 12.1**  
**DRINKING WATER METHODS**  
**PRIMARY INORGANICS (40 CFR PART 141.23 AND 141.74, JULY 1, 2000)**

<u>ANALYTE</u>	<u>REFERENCE</u>	<u>METHOD</u>	<u>METHOD DESCRIPTION</u>
ANTIMONY	USEPA	200.8	ICP/MS
ARSENIC	USEPA	200.8	ICP/MS
BARIUM	USEPA USEPA	200.7 200.8	ICP ICP/MS
BERYLLIUM	USEPA	200.8	ICP/MS
CADMIUM	USEPA	200.8	ICP/MS
CHROMIUM	USEPA	200.8	ICP/MS
COPPER	USEPA USEPA	200.7 200.8	ICP ICP/MS
LEAD	USEPA	200.8	ICP/MS
MERCURY	EPA	245.2	AUTOMATED, COLD VAPOR
NICKEL	USEPA	200.8	ICP/MS
SELENIUM	USEPA	200.8	ICP/MS
THALLIUM	USEPA	200.8	ICP/MS

**DRINKING WATER METHODS (cont'd.)**  
**PRIMARY INORGANICS (40 CFR PART 141.23 AND 141.74, JULY 1, 2000)**

<u>ANALYTE</u>	<u>REFERENCE</u>	<u>METHOD</u>	<u>METHOD DESCRIPTION</u>
NITRATE-N	USEPA	300.0	ION CHROMATOGRAPH
NITRITE-N	SM	4500-N02-B	SPECTROPHOTOMETRIC
FLUORIDE	SM USEPA	4500-F-C 300.0	ISE ION CHROMATOGRAPH
TURBIDITY	USEPA	180.1	NEPHELOMETRIC
TOTAL CYANIDE	SM	4500-CN-F	DISTILLATION/ colorimetric
RES. CHLORINE	SM SM	4500-CL-F 4500-CL-G	DPD-FAS TITRIMETRIC
pH	USEPA	150.1	ISE
SPEC. COND. INST	SM	2510B	DIRECT READING
TDS @ 180C	SM	2540C	GRAVIMETRIC
HARDNESS	USEPA	200.7	CALC FROM CA AND MG
CALCIUM	USEPA	200.7	ICP
MAGNESIUM	USEPA	200.7	ICP
SODIUM	USEPA	200.7	ICP
POTASSIUM	USEPA	200.7	ICP
ALKALINITY	SM	2320B	TITRATION
CHLORIDE	USEPA	300.0	ION CHROMATOGRAPHY
SULFATE	USEPA	300.0	ION CHROMATOGRAPHY
ALUMINUM	USEPA USEPA	200.8 200.7	ICP/MS ICP
IRON	USEPA	200.7	ICP
MANGANESE	USEPA USEPA	200.7 200.8	ICP ICP/MS
SILVER	USEPA	200.8	ICP/MS

ZINC	USEPA	200.7	ICP
	USEPA	200.8	ICP/MS
COLOR	SM	2120B	VISUAL
MBAS	SM	5540C	DIRECT READING
CORROSIVITY	SM	203	CALCULATION
TRIHALOMETHANES	USEPA	524.2	P/T GC/MS
VOLATILE ORGANIC COMPOUNDS (INCLUDING VINYL CHLORIDE)	USEPA	524.2	P/T GC/MS

**DRINKING WATER METHODS (cont'd.)  
RADIOCHEMISTRY (40 CFR PART 141.25, JULY 1, 2000)**

<u>ANALYTE</u>	<u>REFERENCE</u>	<u>METHOD</u>	<u>METHOD DESCRIPTION</u>
GROSS ALPHA	USEPA	900.0	Gross alpha/beta in water
GROSS BETA	USEPA	900.0	Gross alpha/beta in water
RADIUM-226	USEPA	903.0	Radium in water by precipitation/ Rn ingrowth
RADIUM-228	-	-	-
RADON	SM	7500-Rn	Liquid Scintillation
URANIUM (NSHL0797.SDW)	USEPA EPA	908 200.8	Note #1 Uranium in drinking water ICP-MS

Note #1 - USEPA EMSL-LV and Region IX approval/certification letter.

**Table 12.2**  
**WASTEWATER AND GROUNDWATER METHODS**  
**TRACE METALS**

<u>ANALYTE</u>	<u>REFERENCE</u>	<u>METHOD</u>	<u>METHOD DESCRPTION</u>
ALUMINUM	USEPA	200.7	ICP
	USEPA	200.8	ICP/MS
ARSENIC	USEPA	200.8	ICP/MS
BARIUM	USEPA	200.7	ICP
	USEPA	200.8	ICP/MS
BERYLLIUM	USEPA	200.8	ICP/MS
BORON	USEPA	200.7	ICP
CADMIUM	USEPA	200.8	ICP/MS
COBALT	USEPA	200.8	ICP/MS
CHROMIUM	USEPA	200.8	ICP/MS
COPPER	USEPA	200.7	ICP
	USEPA	200.8	ICP/MS
IRON	USEPA	200.7	ICP
MERCURY	USEPA	245.2	AUTOMATED, COLD VAPOR
MANGANESE	USEPA	200.7	ICP
	USEPA	200.8	ICP/MS
NICKEL	USEPA	200.8	ICP/MS
LEAD	USEPA	200.8	ICP/MS
SELENIUM	USEPA	200.8	ICP/MS
VANADIUM	USEPA	200.8	ICP/MS
ZINC	USEPA	200.7	ICP
	USEPA	200.8	ICP/MS
ANTIMONY	USEPA	200.8	ICP/MS
SILVER	USEPA	200.8	ICP/MS
THALLIUM	USEPA	200.8	ICP/MS
MOLYBDENUM	USEPA	200.8	ICP/MS
STRONTIUM	USEPA	200.8	ICP/MS

TITANIUM	USEPA	200.8	ICP/MS
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Note #1 - USEPA Region IX approval for use of Method 200.8.

**WASTEWATER AND GROUNDWATER METHODS (cont'd.)  
NUTRIENTS**

<u>ANALYTE</u>	<u>REFERENCE</u>	<u>METHOD</u>	<u>METHOD DESCRIPTION</u>
AMMONIA-N	SM	4500-NH3-F	ISE W/W/O DISTILLATION
NITRATE-N	USEPA	300.0	ION CHROMATOGRAPHY
ORTHO-P	SM	4500-P-E	ASCORBIC ACID
KJELDAHL-N	SM	4500-NH3-B	DIGESTION-ISE
TOTAL-P	SM	4500-P-E	PERSULFATE-ASCORBIC ACID

**WASTEWATER AND GOUNDWATER METHODS (con'd.)  
MINERALS**

<u>ANALYTE</u>	<u>REFERENCE METHOD</u>	<u>METHOD DESCRIPTION</u>
pH	USEPA	150.1 ISE
SPEC. COND.	SM	2510B DIRECT READING INST
TDS @ 180C	SM	2540C GRAVIMETRIC
HARDNESS	USEPA	200.7 CALC FROM CA AND MG
CALCIUM	USEPA	200.7 ICP
MAGNESIUM	USEPA	200.7 ICP
SODIUM	USEPA	200.7 ICP
POTASSIUM	USEPA	200.7 ICP
ALKALINITY	SM	2320B TITRATION
CHLORIDE	USEPA	300.0 ION CHROMATOGRAPHY
FLUORIDE	USEPA	300.0 ION CHROMATOGRAPHY
SULFATE	USEPA	300.0 ION CHROMATOGRAPHY

**METHODS WASTEWATER AND GROUNDWATER(cont'd.)  
DEMANDS**

<u>ANALYTE</u>	<u>REFERENCE METHOD</u>		<u>METHOD DESCRIPTION</u>
COD	SM	5220C	Closed reflux-Titrametric
TOC	-	-	-
5-DAY BOD	SM	5210B	WINKLER-ISE
C-BOD	SM	5210B	WINKLER-ISE

**WASTEWATER AND GROUNDWATER METHODS (cont'd.)  
MISCELLANEOUS**

<u>ANALYTE</u>	<u>REFERENCE METHOD</u>		<u>METHOD DESCRIPTION</u>
COLOR	SM	2120B	VISUAL
CYANIDE	SM	4500-CN-E	Distillation/spectrophotometric
NON-FILTERABLE RESIDUE (TSS)	USEPA	160.2	GRAVIMETRIC
OIL & GREASE	USEPA	1664	GRAVIMETRIC
RES. CHLORINE	SM	4500-CL-F	DPD-FAS TITRITRIC

## **CHAPTER 5**

### **CONTRACTING SAMPLES TO ANOTHER LABORATORY**

#### **INTRODUCTION**

The Nevada State Public Health Laboratory does not perform the Synthetic Organic Compound (SOC) analyses portion of the required criteria for a water system. Because of this we contract with a laboratory certified to perform the SOCs.

The sampling kits for SOCs are stored at the Nevada State Public Health Laboratory and then are distributed to the clients that request them. The sampling and holding procedures outlined in Table 7.1 are followed. Once the sample has been taken and the kit returned to the laboratory the accessioning department fills out a chain of custody for the contract laboratory and then the courier delivers the kit to the contract laboratory.

The Nevada State Public Health Laboratory does not currently perform some radiochemical analyses. Because of this we contract with a laboratory certified to perform these analytes. Please contact the Laboratory with any questions regarding sampling or analysis if radiochemical samples.