WATER QUALITY POST LAB

This lab like many of the other labs can be incorporated into any number of the units of study. Reference to the labs' processes and/or outcome can be continued throughout the year and hopefully many years to follow:

ECOLOGY UNIT
1. Test the quality of water in:
   a. Swimming Pools
   b. Oceans
   c. Ponds
   d. Standing water
2. Become familiar with the legislation passed or pending (for pending legislation, start a "letter writing" campaign).
3. Learn to read and get information from Water Quality reports.

HUMAN BIOLOGY UNIT
1. Test the bacteria content in:
   a. Saliva
   b. Sinks/Tubs/and Showers in your home
   c. Drinking water
   d. Bottled water
   e. Laundry water

CELL UNIT
1. Importance of water and osmosis or the functioning of cells.

CHEMISTRY UNIT
1. Chemical components of polluted water.
2. The processes of metabolic procedures (also in Cell Unit).

CLASSIFICATION UNIT
1. Water and the Habitat of the Simple Organisms and how the quality of their surrounding affects them.
2. Habitat of "fish tank"
3. Habitat of bacteria

BOTANY UNIT
1. The quality of the water for plant functions.
HOW POTABLE IS YOUR WATER SAMPLE

Water quality management is important in taking care of the environment and in ensuring the health of humans and other organisms, respectively. Scientists have developed methods and tools to achieve this goal. We have experimented with many of these processes. The concept of concentration and how to alter it is very important to a member of a scientist in the water quality team.

Answer the following questions and perform the activity below:

QUESTIONS:
1. What is meant by ppm?

2. What is meant by ppb?

3. What is the usual method of killing pathogenic bacteria and viruses after secondary and tertiary treatment of the waste water?

ACTIVITY:

Another possible method of getting rid of pathogens is dilution.

1. Before starting, make sure you obtain the following data from part III of the lab:

   Count of coliform bacteria ________________________________

   Count of non-coliform bacteria ________________________________

   Total count of bacteria ________________________________

   % of coliform bacteria ________________________________

   % of non-coliform bacteria ________________________________

2. Obtain five 100 mL beakers and label them #1 through #5.

3. Prepare the 5 beakers in order, as indicated in the chart which follows, and record the count and % of bacteria found in each test.

Prepared by Eun Ah Song, Crescenta Valley HS
<table>
<thead>
<tr>
<th>Beaker #</th>
<th>Component A (mL)</th>
<th>Component B (mL)</th>
<th>Coliform Bacteria</th>
<th>Non-coliform Bacteria</th>
<th>Total Bacteria</th>
<th>% Coliform Bacteria</th>
<th>% Non-coliform Bacteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 mL Sample Water</td>
<td>45 mL Tap Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5 mL from Beaker 1</td>
<td>45 mL Tap Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5 mL from Beaker 2</td>
<td>45 mL Tap Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5 mL from Beaker 3</td>
<td>45 mL Tap Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5 mL from Beaker 4</td>
<td>45 mL Tap Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Filter each new beaker and place the gridded filter paper in petri dishes as described in part III of your lab.

g. Incubate the petri dishes overnight, then complete the chart with the appropriate data.

**ANALYSIS:** Answer the following questions.

1. In beakers # 1-5, you performed a serial dilution in order to obtain varying concentrations of bacteria in water. By what factor was each concentration reduced?

2. Do your bacterial counts reflect the reduction?

3. Looking at the Crescenta Valley County Water District Annual Water Quality Report for 1993, does any of your data on the concentration of bacteria meet the County's parameter?

4. As a member of the water quality analysis team, what recommendations would you make in regards to the potability of the water you sampled?
This is a copy of Crescenta Valley County Water District's "Annual Water Quality Report" for 1993, prepared in accordance with State Health Department Regulations. As you will note, concentrations of pollutants in water delivered by Crescenta Valley County Water District are well below Primary Standards set by the State Health Department and the U.S. Environmental Protection Agency. If you have any questions regarding this Report, please contact us.

### PRIMARY STANDARDS - Mandatory Health-Related Standards

#### CLARITY

- **Surface Water Turbidity (NTU)**
  - State MCL: 0.5
  - Average: 0.07-0.09

#### MICROBIOLOGICAL (g)

- **Coliform Bacteria - PA (% Positive)**
  - State MCL: 5.0
  - Average: 0-4.30

- **Fecal Coliform E. coli**
  - State MCL: 0
  - Average: 0

#### ORGANIC CHEMICALS (mg/L)

- **Arsenate**
  - State MCL: 0.003
  - Average: ND

- **Benzene**
  - State MCL: 0.003
  - Average: ND

- **Benzoic**
  - State MCL: 0.003
  - Average: ND

- **Carbon Tetrachloride**
  - State MCL: 0.0005
  - Average: ND

- **Chloroform**
  - State MCL: 0.0001
  - Average: ND

- **1,2-Dichloroethane**
  - State MCL: 0.0002
  - Average: ND

- **1,2-Dichlorobenzene**
  - State MCL: 0.005
  - Average: ND

- **1,2-Dibromoethane**
  - State MCL: 0.005
  - Average: ND

- **1,2-Dichloroethene**
  - State MCL: 0.0005
  - Average: ND

- **1,1-Dichloroethylene**
  - State MCL: 0.006
  - Average: ND

- **2,2-Dichloroethene**
  - State MCL: 0.004
  - Average: ND

- **trans-1,2-Dichloroethylene**
  - State MCL: 0.004
  - Average: ND

- **1,2-Dichlorobenzene**
  - State MCL: 0.005
  - Average: ND

- **1,2-Dibromoethane**
  - State MCL: 0.005
  - Average: ND

- **Di(2-ethylhexyl) Phthalate**
  - State MCL: 0.004
  - Average: ND

- **Ethanol**
  - State MCL: 0.0005
  - Average: ND

- **Ethylbenzene**
  - State MCL: 0.0002
  - Average: ND

- **Ethylene Dichloride**
  - State MCL: 0.0001
  - Average: ND

- **Glycol ethers**
  - State MCL: 0.7
  - Average: ND

- **Heptachlor**
  - State MCL: 0.00001
  - Average: ND

- **Heptachlor Epoxide**
  - State MCL: 0.00001
  - Average: ND

- **Lindane**
  - State MCL: 0.004
  - Average: ND

- **Methoxychlor**
  - State MCL: 0.1
  - Average: ND

- **Methylnitrosamine**
  - State MCL: 0.02
  - Average: ND

- **Monochloroacetic Acid**
  - State MCL: 0.030
  - Average: ND

- **Sulfate**
  - State MCL: 0.010
  - Average: ND

- **1,1,1,2-Tetrachloroethane**
  - State MCL: 0.001
  - Average: ND

- **Tetrachloroethylene (PCE)**
  - State MCL: 0.005
  - Average: ND

- **Toluene**
  - State MCL: 0.070
  - Average: ND

- **Total Trichloroethenes (e)**
  - State MCL: 0.10
  - Average: ND

- **Tribromophenol**
  - State MCL: 0.005
  - Average: ND

- **Trichloroethylene (TCE)**
  - State MCL: 0.005
  - Average: ND

- **Trichlorofluoromethane (Freon 11)**
  - State MCL: 0.15
  - Average: ND

- **1,1,2-Trichloro-1,2, 2-Trifluoroethane (Freon 113)**
  - State MCL: 1.2
  - Average: ND

- **Vinyl Chloride**
  - State MCL: 0.0003
  - Average: ND

- **Xylenes**
  - State MCL: 1.750
  - Average: ND

### INORGANIC CHEMICALS (mg/L)

- **Aluminum**
  - State MCL: 1
  - Average: 0.19-0.23

- **Arsenic**
  - State MCL: 0.005
  - Average: 0.002-0.003

- **Barium**
  - State MCL: 1
  - Average: 0.101-0.119

- **Cadmium**
  - State MCL: 0.010
  - Average: ND

- **Chloride**
  - State MCL: 0.05
  - Average: ND

- **Fluoride**
  - State MCL: 1.6
  - Average: 0.022-0.143

- **Iron**
  - State MCL: 0.05
  - Average: <0.002

- **Magnesium**
  - State MCL: 0.020
  - Average: <0.002

- **Nitrate (as NO3) (g)**
  - State MCL: 48
  - Average: 34-208

- **Selenium**
  - State MCL: 0.05
  - Average: ND

- **Silver**
  - State MCL: 0.05
  - Average: ND

### RADIONUCLIDES (pCi/L)

- **Gross Alpha Activity**
  - State MCL: 15
  - Average: 0.3-2.9

- **Gross Beta Activity**
  - State MCL: 50
  - Average: 0.3-6.2

- **Radium 226 & 228 combined**
  - State MCL: 5
  - Average: ND

- **Strontium-90**
  - State MCL: 8
  - Average: ND

- **Uranium**
  - State MCL: 20
  - Average: ND

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**Water Quality Pre/Post-Lab, Page 9**

5/18/95
## CRESCENTA VALLEY COUNTY WATER DISTRICT
### ANNUAL WATER QUALITY REPORT 1993, continued

### SECONDARY STANDARDS—Aesthetic Standards

<table>
<thead>
<tr>
<th>Parameter</th>
<th>State MCL</th>
<th>Imported (a) Surface Water</th>
<th>Local (b) Groundwater</th>
<th>Combined (c) Delivered Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color (Usua)</td>
<td>15</td>
<td>2–3</td>
<td>&lt;3–15</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Odor—Threshold (Usua)</td>
<td>3</td>
<td>(i)</td>
<td>1–4</td>
<td>ND</td>
</tr>
<tr>
<td>Groundwater Turbidity (NTU)</td>
<td>5</td>
<td>NA</td>
<td>0.05–0.18</td>
<td>0.12–1.7</td>
</tr>
</tbody>
</table>

### CHEMICAL PARAMETERS (mg/L)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloride (mg/L)</td>
<td>82–95</td>
<td>89</td>
</tr>
<tr>
<td>Copper (mg/L)</td>
<td>ND–0.022</td>
<td>0.010</td>
</tr>
<tr>
<td>Forming Agran (MBAS) (ug/L)</td>
<td>0.5</td>
<td>ND</td>
</tr>
<tr>
<td>Iron (mg/L)</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Magnesium (mg/L)</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Specific Conductance (μS/cm)</td>
<td>900</td>
<td>894–105.6</td>
</tr>
<tr>
<td>Sulphate (mg/L)</td>
<td>250</td>
<td>205–271</td>
</tr>
<tr>
<td>Total Dissolved Solids (mg/L)</td>
<td>500</td>
<td>555–664</td>
</tr>
<tr>
<td>Zinc (mg/L)</td>
<td>5.0</td>
<td>ND</td>
</tr>
</tbody>
</table>

### ADDITIONAL PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium (mg/L)</td>
<td>60–75</td>
<td>69</td>
</tr>
<tr>
<td>Hardness (CaCO3) (mg/L)</td>
<td>251–313</td>
<td>287</td>
</tr>
<tr>
<td>Magnesium (mg/L)</td>
<td>24–30.5</td>
<td>28</td>
</tr>
<tr>
<td>pH (units)</td>
<td>7.96–8.09</td>
<td>8.05</td>
</tr>
<tr>
<td>Potassium (mg/L)</td>
<td>4.3–5.3</td>
<td>4.7</td>
</tr>
<tr>
<td>Sodium (mg/L)</td>
<td>79–104</td>
<td>95</td>
</tr>
</tbody>
</table>

### AMOUNT OF WATER DELIVERED

- **34%**
- **65%**
- **100%**

### KEY TO ABBREVIATIONS

- **MCL** = Maximum Contaminant Level
- **ND** = Not Determined
- **NA** = Not Analyzed
- **NC** = Not Collected
- **NS** = No Standard
- **NTU** = Nephelometric Turbidity Unit
- **pC/L** = parts per million
- **ug/L** = micrograms per liter
- **<** = less than

1. (a) = Importent water from Metropolitan Water District's F.E. Weymouth Treatment Plant. For averaging purposes, ND is considered as zero.
2. (b) = Data shown are either hourly averages or are results of tests analyses performed on groundwater source (1 well).
3. (c) = Data shown are based on either actual blended analyses performed, where applicable, or are calculated results based on proportion of imported/goundwater delivered.
4. (d) = Total chlorine/MCL. No more than 5.0% of the monthly samples may be total chlorine—positive. Total chlorine/MCL: The occurrence of 2 consecutive monthly positive samples, one of which contains fecal coliform, is considered an exceed MCL violation.
5. (e) = Calculated on a running annual average. Compliance is based on a running annual average.
6. (f) = State level is dependent upon temperature.
7. (g) = Negative values occur when the background count, as part of the analytical method, exceeds the count in the actual sample.
8. (h) = Metropolitan has developed a flavor—profile analysis method that can more accurately detect odor occurrences. For more information, contact Metropolitan.
9. (i) = Recommended level.
10. (j) = Data only collected on influents for imported water.

In addition to the above regulated constituents, we have conducted monitoring for 52 additional organic chemicals for which the California Department of Health Services and USEPA have not yet set a standard and all results were below detection levels unless otherwise noted. Note: Chloroform has been found above detection limit. If you have additional questions or concerns regarding the quality of your water, please call Mike Sovich of our office at (818) 248–3925.