

# Problem Set 1—Key

CENG 340—Introduction to Environmental Engineering

Instructor: Deborah Sills

September 1, 2013

1. (40 pts) Many questions about Floyd—Snyder or Dr. Heavner’s career were acceptable. Questions that were not specific (e.g., What was the most interesting project you worked on) received half credit.

2. (21 points)

- (a) Susquehanna River, White Deer Creek, and Spruce River Reservoir.
- (b) No violations. Coliforms and lead (either or both) may be a problem.
- (c) Coliform is a biological constituent; lead is a chemical constituent.

3. (39 points)

- (a)  $\rho_{\text{H}_2\text{O}} = 1 \frac{\text{g}}{\text{mL}} = 1000 \frac{\text{g}}{\text{L}}$

$$[\text{C}_6\text{H}_6]_{\text{MCL}} = 0.005 \frac{\text{mg}}{\text{L}} \times \frac{1 \text{ g}}{1000 \text{ mg}} \times \frac{1 \text{ L}}{1000 \text{ g}} = 5 \times 10^{-9} \frac{\text{g}}{\text{g}} \times 10^6 \frac{\text{ppm}_\text{m}}{\frac{\text{g}}{\text{g}}}$$

$$[\text{C}_6\text{H}_6]_{\text{MCL}} = 0.005 \text{ ppm}_\text{m}$$

- (b)

$$[\text{C}_6\text{H}_6]_{\text{MCL}} = 0.005 \text{ ppm}_\text{m} \times \frac{10^3 \text{ ppb}_\text{m}}{\text{ppm}_\text{m}} = 5 \text{ ppb}_\text{m}$$

- (c) Molecular weight of benzene ( $\text{C}_6\text{H}_6$ ) =  $12 \times 6 + 1 \times 6 = 78 \frac{\text{g}}{\text{mole}}$

$$[\text{C}_6\text{H}_6]_{\text{MCL}} = 0.005 \frac{\text{mg}}{\text{L}} \times \frac{1000 \text{ L}}{\text{m}^3} \times \frac{1 \text{ g}}{1000 \text{ mg}} \times \frac{1 \text{ mole}}{78 \text{ g}}$$

$$[\text{C}_6\text{H}_6]_{\text{MCL}} = 6.4 \times 10^{-5} \frac{\text{mole}}{\text{m}^3}$$