ANSWER **ANSWER** **ANSWER**

Round: 9B

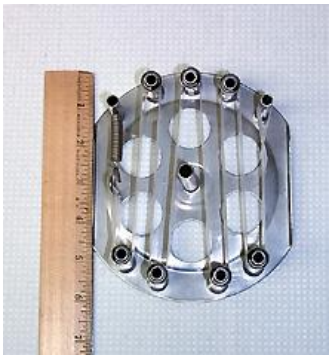

Figure 1: SMPDs wrapped around pegs of a steel plate

Figure 2: Canister of 5 stacked SMPDs

These are images of a semipermeable membrane device (SMPD) used to determine the status and trends of contaminants in coastal areas. SMPDs are made of a polyethylene membrane with a thin film of triolein (a lipid). Data from SMPDs can assist natural resource managers in making informed decisions and developing strategies to minimize water pollution.

1. Is the SMPD an active or passive sampling device?

   A passive sampling device. (3 pts)

2. What type of contaminants does a SMPD measure? Give two examples. (3 points)

   - *Levels of hydrophobic organic compounds (1 pt).*

   Any TWO (2) of the following examples are acceptable (1 pt each; 2 pts total)

   - *PCBs*
   - *PAHs*
   - *organochlorine pesticides*
   - *dioxins*
   - *furans*
   - *organophosphate pesticide*
   - *atmospheric transport*

3. What are three potential sources of these contaminants?

   Any THREE (3) of the following (1 pt each; 3 pts total):

   - *Agricultural runoff*
   - *Residential runoff*
   - *Sewer overflow*
   - *Pesticides*
   - *Industrial waste*

4. SMPDs were designed to mimic aquatic organisms that concentrate contaminants in their bodies. What is this concentration of contaminants called? Give an example of one (1) organism that exhibits this process.
   Biomagnification OR bioamplification OR biological magnification (2pts), Bivalves (mussel, oyster, clam) OR fish (1pt)
5. List four (4) advantages to using the SMPD instead of aquatic organisms.
   Accept any FOUR (4) of the following (2 pts each; 8 points total):
   - Deployment in water where no organisms are present
   - In water too toxic for organisms
   - Easier to calibrate/standardize
   - Eliminates biological issues (e.g., migration, mortality, metabolism)
   - Can be deployed for long periods of time (e.g., days/months)
   - Can account for surges in concentration levels due to rain/runoff events, spills, etc.
   - Can be anchored to a solid structure in the water column

Reference: http://oceanexplorer.noaa.gov/technology/tools/spmds/spmds.html