Fate & Transport of Chemicals in the Environment

Homework #1 — University of South Florida
Due Monday, Jan. 24, 2022 — Prof J A Cunningham

(1) (90 pts) Prepare a short report (a few pages maybe?) about a contaminant that is known to be present in our environment. In your report, try to answer the following questions, though not necessarily in this order – you can decide what makes sense:

- What is this chemical used for? (presumably it has some beneficial use)
- How does this chemical typically end up in the environment? (leaks, spills, intentional application, etc.?)
- When this chemical is released into the environment, what happens to it? Does it biodegrade easily, or is it persisent? Does it bioaccumulate in the food web? Does it tend to end up in the air, in the water, in the soil, in the plants, in the fish? Why?
- How does the structure of the chemical affect its behavior?
- How do humans typically come into contact with this chemical?
- Are there known health effects on humans? At what levels or concentrations is the chemical believed to be hazardous to people?
- Are there other detrimental effects of this chemical in the environment? (e.g., does it harm animals or ecosystems?)
- Once this chemical is released into the environment, how easy/hard is it for us to clean it up?
- Are there any particular famous cases of contamination by this chemical?

Here is a list of candidate chemicals you can use for this assignment – pick one:

- perflourooctanoic acid (PFOA) / perfluorooctane sulfonate (PFOS)
- polybrominated diphenyl ethers (PBDEs)
- polychlorinated biphenyls (PCBs)
- DDT
- 1,4-dioxane
- methyl *tert*-butyl ether (MTBE)
- perchlorate
- endocrine-disrupting compounds (EDCs) such as 17β-estradiol
- mercury (Hg)
- chlorpyrifos
- sulfonamide antibiotics such as sulfamethoxazole
- dioxins and furans
- trichloroethene (TCE)
- atrazine
- tributyltin (TBT) compounds
- chromated copper arsenate (CCA)
- hexavalent chromium, Cr(VI)

Please be sure to cite your sources of information. Web sites are fine, but *indicate clearly what information comes from what source*. Include a reference list or footnotes as necessary.

(2) (10 pts) Read the syllabus carefully. As you are reading it, make a list of questions that you have. After all team members have read the syllabus, compile your questions into one list. Submit your list of questions with this assignment. If you do not have any questions, just write "We read the syllabus and we don't have any questions," and that will be fine.

(3) (not required, but recommended) Watch a movie about chemicals in the environment. It can be a documentary, or it can be a fictionalized version of a real-life case. A few good ones are *A Civil Action*, *Erin Brockovich*, *There's Something in the Water*, and *Dark Waters*. (…but make sure you get the right version of *Dark Waters*; I think it is a 2019 release date.) Here are some things to keep track of as you watch the movie:

- What is the name of the main character? What is his/her profession?
- What chemical is implicated in the movie?
- What entity was allegedly responsible for discharging this chemical into the environment? (In the case of *Erin Brockovich*, I believe the company has actually admitted that they were the source of the contamination, but in *A Civil Action*, the defendants never admitted it came from them. I am not sure about *Dark Waters*.)
- How were people allegedly exposed to the chemical in question? (e.g., was it in the air, in the water, in the soil, in the fish?)
- What city/town/community was allegedly harmed by the chemical? (i.e., where does the movie take place?)
- What health effects are alleged to have occurred as a result of the presence of the chemical in the environment?
- Was the situation ever resolved? If so, what was the resolution?