

## ***Mercury in the Environment***

You will work in a group of two or three people for the next few days and research the topic outlined below.

### **Roles**

1. Scientists working at university
2. Scientists working for regulating agency
3. Environmentalist
4. Industry Employee
5. President of the industry
6. Doctor
7. Town resident who eats contaminated fish
8. Mayor of the town
9. Other roles

### **Scenario/Background Information**

An industrial company that produces chemicals released Hg into a river as part of their wastewater discharge. Although the company did this from 1930 to 1950, there is still Hg in the river and the watershed. The company manufactured acetate and Hg was used as a solvent in the process. Although the company had methods to recover almost 99% of the Hg, they used the 1% that they could not recover was dumped into the river. This was common practice at the time. When Hg was released into the river, it dissociated (became ions) and chemically bound to the sediment in the river. It sticks to mud in the river and stays in the river for a very long time (several decades or more).

Hg is a toxic chemical that can cause severe neurological disorders and in extreme cases, even death. Hg bioaccumulates in a food web and the organisms at the highest trophic levels usually have the highest concentrations. Hg from sediment goes through a chemical process in which a methyl group attaches to the Hg and it is converted to a toxic substance called MeHg. Researchers have found that the fish in this river have high concentrations of MeHg in them. There are people living in the watershed that eat the fish and could get sick.

This is a complex problem with various aspects to it. There are several groups with different interests to consider. In one aspect of this situation, you have the industrial company responsible for the pollution. This company did not intend for people to get sick and they followed a practice that was common during the 1930s to 1950s. The health hazards of many industrial chemicals have only recently been discovered. At the time of the dumping, the company did not know that they were releasing a chemical that would make people sick. However, they are now responsible for the damage that this dumping caused. This company employs many people and their jobs could be at risk depending on what the outcome of this problem is.

In another aspect of this situation, you have people who have been living in this watershed all of their life. The river is like their home and they have spent hours

swimming, fishing, and boating here. They didn't realize these activities would eventually put them at risk. Now they are faced with the issue that the place they have called home and have enjoyed all their lives is a place of potential danger.

The people responsible for understanding this problem and characterizing the extent of the damage are the scientists who work for academic institutions, regulating agencies, and the company itself. However, these scientists have issues, which include budgets, deadlines, other responsibilities, and many times the schedule for figuring out the problem doesn't always match the schedule for finding the best solution to the problem.

Environmentalists many times are very passionate about cleaning up pollution and protecting the environment from future damage. They are concerned with the damage that is presently being inflicted on the Earth and our natural resources. However, these people are not necessarily educated in technical aspects of these issues and could make decisions based on their feelings or opinions, not in scientific theory and research. This can often confuse the issue and lead to additional complications.

### **Select a role that you will feel the most comfortable playing in this situation.**

For this role, please answer the following questions:

1. What are the specific issues you face in your role?
2. What do you already know about this problem?
3. What do you need to know to come to a solution?
4. In your groups, assign various responsibilities for researching this problem.
5. Identify the resources you will need (the internet, textbooks, journal articles, newspaper articles, etc.)
6. Conduct the research
7. Organize your research into a presentation for the class. Use an appropriate format: power point presentation, article summary, brochure, pamphlet, poster.
8. Provide a convincing argument regarding your position on this issue.

### **Questions for each group**

#### ***Scientists***

1. how will you design a study to determine the extent of the pollution?
2. Where is the Hg? Where is it going?
3. What can you do to "fix" the problem?
4. What species are affected?
5. What samples will you need?
6. What timeline? Budget?
7. How will you make people aware of the problem?

### ***Environmentalists***

1. What is your ultimate goal? (do you want to pay polluters pay, do you want to increase community awareness?)
2. How will you achieve this goal? (what specific steps will you take?)
3. What is your timeline of milestones?
4. How much money will this cost?
5. How will you make people aware of your position?

### ***Industry Employee***

1. Do you support the company? What about the Hg? Did you know what was happening?
2. What will you do if the company is found responsible?
3. What will you do if you need to look for a new job?
4. Will you consider working for this type of industry again?
5. Was the company responsible? What about the social aspects of this problem?
6. What about the government and environmental regulation?

### ***President of Industry***

1. Do you support the company? What about the Hg? Did you know what was happening?
2. What will you do if the company is found responsible?
3. How will you pay for the damages?
4. How will you balance the budget? Keep employees?
5. How can you minimize the likelihood that this will happen in the future? What specific steps can you take?
6. What is different now that wasn't then?

### ***Doctors***

1. How did you diagnose this patient?
2. What evidence did you use?
3. Are you confident in the diagnosis?
4. What treatment did you recommend?
5. How can other patients minimize their risk of being affected?

### ***Town resident***

1. How did you find out you were sick?
2. How do you feel about this?
3. Do you hold the company responsible? Do you plan to press charges?
4. What about your friends and neighbors who are affected by potential job layoffs?
5. Will you continue to use the river recreationally?
6. Did you ignore the warnings about eating the fish?

### ***Mayor of the town***

1. How will you make the residents aware of the problem?
2. What do you think the best method for making the "polluters" pay?

3. How will you balance the needs of the community? (keeping jobs, while keeping residents healthy)
4. What should be done to fix the problem?
5. What about the people who live on the river and eat the fish?
6. What about the corporation that could potentially go out of business?

### **Tips for a successful project**

1. Make sure to create a presentation in a format, which will best describe your position (power point, poster, brochure).
2. Include a **WRITTEN SUMMARY** (on a piece of paper) of the following points:
  - Make sure your position is clearly stated.
  - Answer all the questions as best as possible using the rules for journaling.
  - Be sure to tell me where you stand on this issue.
  - Tell me all the resources you used.
3. Be convincing: *why should I care about your position?*

#### Additional guidelines:

1. You will be evaluated on your presentation both by myself and Mrs. Buswell, as well as the class in general.
2. You will also be evaluated on how you worked in the group. Make sure you contribute because it will be part of your grade!
3. The results of your findings will be presented to all the groups in a town meeting. Be prepared to argue your position.

#### What you will need **BY WEDNESDAY, May 16, 2007:**

1. Power point or poster or brochure.
2. Written summary.