

## Mercury in the San Francisco Bay Video Worksheet – Teacher Key

As students watch the video, they can fill out this worksheet to learn more about mercury in our environment. You can also do the worksheet together as a class after watching the worksheet or have them work in small groups.

### 1. What unique challenges does mercury present to scientists?

- Naturally occurring metal, that is widespread throughout the whole environmental system
- Mercury does not break down in the environment; it is "persistent" and builds up in the food chain (**bioaccumulation – introduce this word and meaning to the students with short reading – on last page**).
- Any exposure to mercury is not good for human health (it is poisonous at low concentrations, neurotoxic – You have to measure it accurately).
- You can't see it.
- Exists as liquid and gas

### 2. What is the red rock called where mercury is found? Cinnabar

### 3. Identify three ways that fish and wildlife are impacted by methylmercury.

- Eggs don't hatch
- Birth defects
- Weaker and could get diseases

### 4. Name three types of fish most likely to bioaccumulate and have higher concentrations of methylmercury? Swordfish, shark, sturgeon, ahi (tuna), albacore (tuna), sea bass, large halibut

### 5. California needed mercury for the gold mines, because mercury is naturally attracted to gold. What is the name of mercury when it is heated and turned into liquid? Quicksilver

### 6. Name other ways mercury is used.

- Electric switches
- Fluorescent bulbs
- **Not mentioned:** Thermometers, thermostats, dental amalgam, old latex paint and some oil-based paint, and others (**students can do a search on the web to find mercury uses**)

### 7. What are ways that we might be exposed to mercury?

- Mercury can be leached into recreation waterways (or come from rainfall when it is in the air), it contaminates the water, and then we eat the fish from the water
- **Not mentioned:** Breathing vapors from broken products that contain mercury
- **Not mentioned:** From fillings at the dentist.

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8. **Name three symptoms people experience from methylmercury poisoning?** Insomnia, sore muscles and joints, fatigue, trouble concentration, and stomach upset.

**Option:** Have students go on-line and view the interactive body showing mercury health effects from ATSDR: <http://www.atsdr.cdc.gov/dontmesswithmercury/body.html>

**Emphasize:** Mercury is measured at one part per billion (that's a drop of water in a swimming pool). So, very small levels of mercury can be too much. (**Side note not mentioned:** There is greatest concern for fetuses and children, because it keeps their brains and nervous systems from developing normally. Mercury readily crosses the placenta, and concentrates in fetal blood at levels 30 times higher than in the mother.)

9. **What are ways people can reduce their exposure to mercury?**

- Control erosion and clean up old mine sites, so it doesn't get in our water system.
- Be careful about eating too much fish on the top of the food chain – shark, ahi tuna, and swordfish are mentioned in the video. Follow fish consumption advisories.

Resource:

<http://www.fda.gov/Food/FoodbornellnessContaminants/Metals/ucm393070.htm>

- **Not mentioned:** Be aware of products that contain mercury and choose mercury-free alternatives

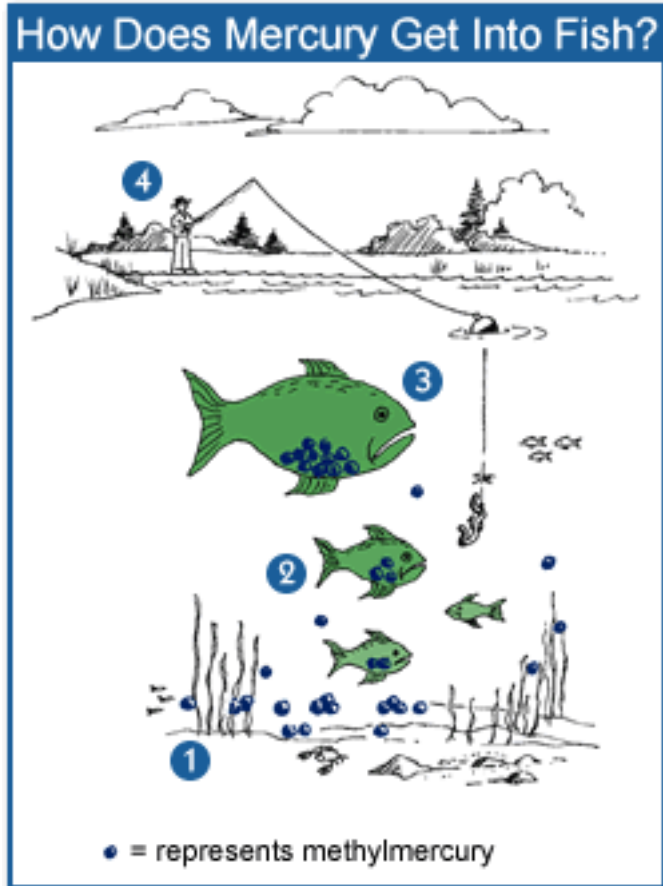
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### Bioaccumulation of Mercury

Once in a lake or river, mercury is converted to methylmercury by bacteria and other processes. Fish absorb methylmercury from their food and from water as it passes over their gills. Mercury is tightly bound to proteins in all fish tissue, including muscle. There is no method of cooking or cleaning fish that will reduce the amount of mercury in a meal.

Methylmercury accumulates as you move up the food chain:

1. Methylmercury in the water and sediment is taken up by tiny animals and plants known as plankton.
2. Small fishes eat large quantities of plankton over time.
3. Large predatory fish consume many smaller fish, accumulating methylmercury in their tissues. The older and larger the fish, the greater the potential for high mercury levels in their bodies.
4. Fish are caught and eaten by humans and animals, causing methylmercury to accumulate in their tissues.



Credit: <http://www.mercvt.org/envIRON/bi 1>