

Handout 4— Water Pollution

As an environmental investigator, you receive a phone call about possible pollution in a stream. Using your *Student Reference Tables*, enter the possible pollutant(s) and its source for each of the water pollution scenarios below. The pollutants can be nutrients, oxygen-demanding substances, suspended solids, sedimentation, or toxic substances.

	Scenario	Possible Pollutant(s)	Possible Pollutant Source(s)
1	A rainbow film is on the surface and a nearby ditch carries stormwater from the highway into the stream.		
2	There is a musty odor; animal feedlots and construction sites are nearby.		
3	A storm caused trees to fall into the stream over a month ago; the water now resembles coffee.		
4	There is a faint odor of bleach; aquatic plants near an outfall are very light colored.		
5	Water is bright green; next to the stream are very lush residential yards and a construction site.		
6	A stream near a construction site is very turbid and light brown. Also nearby is a residential area.		
7	There is a smell of rotten eggs; a road and an old residential area (that uses septic systems) are next to the stream.		
8	An unusual smell is coming from the stream, very sharp and pungent. Nearby are a city and outfalls for both an industrial source and a wastewater-treatment plant.		
9	The stream contains fungus that feels slimy and resembles the texture of cotton. It is found near an outfall.		
10	The bottom of a stream became very muddy and the water is turning green. Nearby are forests and also croplands.		

Student Reference Tables

The following tables can help you determine if there is possible pollution in your stream by only using your senses. Use *Table 1—Physical Indicators of Water Pollution* to help determine the possible pollutant and then use *Table 2—General Land Uses That Might Affect Water Quality* to help determine the possible pollution source.

Table 1—Physical Indicators of Water Pollution

If you see the color(s) ...	The issue could be ...
Muddy tan to light brown	Suspended solids (silt and clay) due to: <ul style="list-style-type: none"> • upstream erosion of the banks and substrate due to channelization, • stormwater from logging or construction sites with inadequate erosion and sediment controls, or • Stormwater from one or more areas with soil erosion, such as poorly maintained croplands and rangelands, riparian zones with removed vegetation, exposed banks, etc.
Pea green, bright green, yellow, brown, brown-green, brown-yellow, blue-green	An algal bloom due to high nutrient content (phosphorus, nitrogen, or both). Water color is dependent on the dominant plankton type.
Tea or coffee	Dissolved decaying matter originating from the organic portion of the soil. This is usually seen in woodland or swampy areas.
Milky white	Paint (from a construction site) or milk (from a food processing site).
Dark red, purple, blue or black	Fabric dyes or inks from paper or cardboard manufacturers.
Milky gray or black	Oxygen depletion from raw sewage or other oxygen-demanding substance; a rotten-egg or hydrogen sulfide odor might be present.
Clear black	Turnover of oxygen-depleted bottom waters or sulfuric acid spill.
Orange-red	Deposits on stream beds often associated with oil-production areas, but not always (check for petroleum odor). The color could be due to iron in the water.
White, crusty deposits	Common in dry or arid areas where the evaporation of water leaves behind salt deposits. These deposits are also associated with brine water discharge (from oil production areas); check to see if the stream has a petroleum odor or an oily sheen along the banks.
If you smell ...	The odor is from ...
Rotten eggs or hydrogen sulfide	Raw sewage (oxygen-demanding substance) or oxygen-poor sediment.
Chlorine	Treated effluent, swimming pool overflow, or industrial discharges.
Sharp, pungent odor	Chemicals or pesticides.
Musty odor	Presence of raw or partially treated sewage or livestock waste (organic-demanding substances). Musty odor could also be caused by algae.
If you see on the surface ...	Possibly caused by ...
Tan foam	Water containing organic materials with high flow or wave action. This harmless foam can be in small patches to very large clumps.
White foam (thin or billowy)	Soap in treated effluent, possibly around a wastewater outfall.
Yellow, brown, black film	Pine, cedar, and oak pollens that form a film on the surface of ponds, backwater areas, or slow-moving water of streams.
Rainbow film	Oil or other fuel type. Sheens are common after rains when oil and gas residue wash off streets. Other sources include spills, pipelines, and oil and gas-production areas.

Table 2 — General Land Uses That Might Affect Water Quality

Land Use Type	Potential Effects
Woodland	Erosion from logging, road construction, or clear cutting may cause muddy waters.
Agricultural Land (croplands, pastures, feedlots, etc.)	Fertilizers or manure draining into a stream may increase the nutrient content and cause excessive algal and aquatic plant growth. Sedimentation may occur from soil erosion. Streams may also receive pesticides and herbicides in the runoff.
Cities and Towns	Depending on the activities occurring in the city or town, urban runoff might carry a variety of contaminants such as oil, pesticides, metals, and chemicals.
Industry	Industries have numerous types of chemicals and products that could cause color changes to the water, excessive algal growth, odors, absence of aquatic life, fish kills, elevated organic matter levels, and sewage fungus.
Wastewater-Treatment Plants	Effects may include excessive algal growth, white foam, sludge deposits (fluffy dark brown or gray solids), absence of fish and insects (or the abundance of tolerant forms), variable dissolved-oxygen levels, chlorine odor (and possible bleached vegetation near the outfall), sewage fungus, and elevated levels of <i>E. coli</i> .
Construction	Runoff from construction sites can cause water to become muddy and turbid.
Residential	Runoff from residential areas may contain fertilizers (nutrients), oil drained from cars (toxic substances), raw sewage from septic systems that overflow or leak (oxygen-demanding substances), detergents used to wash cars (toxic substances), and even litter (cans, bottles, paper, etc.).