Final Public Health Goal for Hexavalent Chromium

A fact sheet by the Office of Environmental Health Hazard Assessment, California Environmental Protection Agency

July 2011

Q. What is a Public Health Goal (PHG)?

A. A Public Health Goal or PHG is a level of a contaminant in drinking water that does not pose a significant health risk.

A PHG is not a regulatory standard. It is only one step in the process of developing an enforceable standard that is set by the California Department of Public Health for drinking water that public water systems must meet.

State law requires OEHHA to develop PHGs for regulated drinking water contaminants. The PHG for chromium 6 is 0.02 parts per billion (ppb), which is the estimated "one in one million" lifetime cancer risk level. This means that for every million people who drink two liters of water with that level of chromium 6 daily for 70 years, no more than one person would be expected to develop cancer from exposure to chromium 6. The "one-in-one million" risk level is widely accepted by doctors and scientists as the "negligible risk" standard.

A PHG reflects the risk from long-term exposure to a contaminant and should not be used to estimate risks from short-term or acute exposure.

Q. What is hexavalent chromium?

A. Hexavalent chromium, also known as chromium 6, is a heavy metal that is commonly found at low levels in drinking water. It can occur naturally but can also enter drinking water sources by historic leaks from industrial plants' hazardous waste sites. Various other sources also contribute to the amount of hexavalent chromium in groundwater. Chromium 6 is known to be a potent carcinogen when inhaled. It was recently found to also cause cancer in laboratory mice and rats that were exposed through drinking water.

Q. What is the difference between chromium 6 and chromium 3?

A. Chromium is found in drinking water sources and the environment in two principal forms: trivalent chromium (chromium 3) and hexavalent chromium (chromium 6). Chromium 3 is found naturally in foods at low levels and is an essential human dietary nutrient. Chromium 6 is the more toxic form of chromium.

Chromium can transform from its hexavalent form to its trivalent form, and vice versa. When an industrial facility emits chromium 6 into the environment, it is sometimes deposited into the soil and often is converted to chromium 3 with some remaining traces of chromium 6.

OEHHA's PHG focuses on hexavalent chromium, not trivalent chromium.

Q. How is chromium used?

A. Chromium is used in many products and processes, including stainless steel, textile dyes, wood preservation, leather tanning, and anti-corrosion coatings. Chromium coatings are applied to aluminum, zinc, cadmium, copper, silver, magnesium and tin to prevent rust or other damage that can occur from exposure to oxygen.

Q. How is a PHG used?

A. The California Department of Public Health (CDPH), which regulates public drinking water suppliers, uses PHGs to set California's regulatory drinking water standards, officially known as Maximum Contaminant Levels (MCLs). State law requires CDPH to set each MCL as close to the corresponding PHG as is economically and technically feasible, and to place primary emphasis on the protection of public health.

CDPH can set the MCL above the level of the PHG if it finds that it is not economically or technically feasible to reduce the contaminant to the PHG level. State law prohibits OEHHA from considering economic issues when it develops a PHG.

An MCL is an enforceable standard. This means that when an MCL is established for a specific contaminant, the level of that contaminant in public drinking water systems must not exceed the MCL. The PHG is not an enforceable standard.

Q. How is a PHG established?

A. The process for establishing a PHG is detailed and rigorous. OEHHA scientists first compile all relevant scientific information available. This includes studies of the chemical's effect on laboratory animals and studies of humans who were exposed to the chemical. The scientists use the data from these studies to perform a health risk assessment that determines the levels of the contaminant in drinking water that could be associated with various adverse health effects.

OEHHA must consider many factors in the health risk assessment. They include impacts on certain groups of people, such as pregnant women, young children, the elderly or persons with pre-existing illnesses. These groups may be especially susceptible to the chemical's adverse effects.

To calculate a PHG, OEHHA uses this information to identify the level of the chemical in drinking water that would not cause significant adverse health effects in people who drink that water every day for 70 years. OEHHA assumes that an adult will drink two liters of water per day. OEHHA must also consider any evidence of immediate and severe health effects. It establishes the PHG at a level that provides protection against any known cancer and "non-cancer" health effects associated with exposure to the chemical.

For more information on PHGs, please visit
http://www.oehha.ca.gov/water/phg/pdf/PHGfacts.pdf.

Q. Is drinking water dangerous if it contains a contaminant that exceeds the PHG?

A. A PHG is NOT a boundary line between a "safe" and "dangerous" level of a contaminant. Drinking water can still be acceptable for public consumption if it contains contaminants at levels higher than the PHG. A PHG is a health-protective level of a contaminant in drinking water that California's public water systems should strive to achieve if technically and economically feasible.

Q. What are the health effects of hexavalent chromium in drinking water?

A. A 2007 National Toxicology Program (NTP) study found significant numbers of gastrointestinal tumors in male and female rats and mice that consumed drinking water with chromium 6. In addition, OEHHA's analysis of data collected from China found increased rates of stomach cancer in people exposed to high levels of chromium 6 from drinking water.

Scientific studies have found a higher than average rate of lung and gastrointestinal cancers in workers who inhaled chromium 6 on the job. There is substantial evidence that chromium 6 can damage DNA.

Exposure to chromium 6 from breathing dust or fumes is considered much more dangerous than exposure from drinking water. It is estimated that exposure to airborne chromium 6 is 1000 times more potent than exposure from drinking water.

Q. Is there a federal standard for chromium 6 in drinking water?

A. No. The federal government currently regulates only total chromium. The current PHG for chromium 6 is a first for California and the nation. The eventual MCL for chromium 6, once it is established, is expected to be the first standard in the nation to address chromium 6 in drinking water. The current state MCL for total chromium will remain in effect until a specific state standard for chromium 6 is established.

Q. Where can I find additional information?

A. Local public water systems, county health or environmental departments are also good sources of information on contaminants in your local drinking water supply. Your water bill lists contact information. You can also contact your city's public works department.

State law requires public water systems to send customers an annual consumer confidence report that describes the source of the water and any contaminants detected. The report should list the current level of contaminants, their PHGs and their primary MCLs. The report will also disclose if contamination is higher than the MCL and include a statement regarding accompanying health concerns.

If your source of drinking water is a private well, contact your county health or environmental health department for water quality standards and testing information.