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TECH NOTES

Hexavalent Chromium – What is it?

California has been addressing **Hexavalent Chromium** (Cr-6) since Erin Brockovich began bringing this issue to light in 1991, with a subsequent movie in 2000 (The Erin Brockovich Story). The Environmental Working Group, an environmental watch-dog organization, performed a study of cities across the United States and found Cr-6 in 31 of the 35 cities' drinking water. The EPA took an aggressive position and developed a guidance document to address the potential Cr-6 problems.

McCoy & McCoy Laboratories, Inc. (MMLI) has responded to the need of public water systems and has developed the capability to perform Cr-6 at low level detection limits utilizing EPA Method 218.6. MMLI realizes there is a lot of information to be found on this topic. Condensed below is some information concerning Cr-6.

WHAT IT IS:

- Chromium (Cr) is a metallic element that occurs naturally in the environment and can be associated with iron.
- The odorless, tasteless, malleable metal takes a high polish and has a high melting point.
- The most common forms of chromium in the environment are Trivalent (Cr-3), Hexavalent (Cr-6) and the metallic form chromium (Cr).

OCCURRENCE:

- Trivalent chromium occurs naturally in the environment and can be found in rocks and soil as well as fruits, vegetables and meat.
- Hexavalent chromium is a by-product of industrial processes — forging stainless steel, chrome plating, manufacturing dyes and pigments, tanning leather, producing photographic materials and staining wood.
- People working in, and/or living in, the vicinity of industrial plants using dichromate salts have a higher possibility of being exposed to Cr-6 via water contamination, inhalation and skin contact.

HEALTH EFFECTS:

- Cr-3 is not considered a health risk. It is a mineral nutrient essential to cell membrane receptor sites stimulated by insulin. In the absence of trivalent chromium, tissues resist insulin's influence. Blood sugar cannot enter cells to be metabolized and signs of Type II diabetes may appear. The federal government has established a minimum daily requirement of 50 to 200 milligrams of chromium for dietary ingestion.
- Cr-6 is considered toxic. Exposure to hexavalent chromium may cause the following symptoms:

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|---------------------------|---------------------------------|
| - Kidney and liver damage | - Damaged respiratory membranes |
| - Damaged nasal septum | - Nosebleeds |
| - Reproductive problems | - Lung cancer |

REGULATION:

- The U.S. Environmental Protection Agency (EPA) has set a maximum contaminant level (MCL) for total chromium of 0.1 ppm (100 ppb) in drinking water.
- Tap water has an average of 0.4 to 8 ppb of chromium.

WATER TREATMENT:

- Reverse osmosis and distillation will reduce all types of chromium found in water.
- Cr-3 can be removed from water with a strong acid cation ion exchange resin in the sodium form. An acid strip will normally be required periodically to strip Cr-3 from the resin, followed by a normal salt regeneration to convert the resin to the sodium form. A second regeneration may be necessary if the pH of the service cycle is too low.
- Reverse osmosis, deionization and distillation are considered effective in removing Cr-6.

