Jacklyn Vo
November 8th, 2019
ENVS 120A

Chromium – a Concern in Santa Barbara County?

"Chromium is an odorless and tasteless metallic element found naturally in rocks, plants, soil and volcanic dust, and animals" (EPA 2019). As trivalent chromium (Cr^{+3}) is an essential human nutrient, found in fruits, grains, and meats, hexavalent chromium (Cr^{+6}) is produced by industrial processes and natural chromium erosion that can cause kidney damage, respiratory cancer, and dermatitis (OSHA n.d.). Santa Barbara County currently does not regulate the MCL for Cr^{+6} because the California Water Resources Control Board no longer requires it. Instead of having distinct regulation standards, the Maximum Contaminant Levels (MCL) for Cr^{+3} and Cr^{r+6} is monitored under total chromium. This is a concern because chromium, depending on their forms, have different thresholds. Although California no longer regulates Cr^{+6} MCL concentrations, the County of Santa Barbara should be concerned for its residents' health.

The federal drinking water standard for total chromium is 0.1 mg/l or 100 parts per billion (ppb) (EPA 2019). The California Public Health Goal (PHG) for Cr^{+6} is 0.02 ppb and MCL is 10 ppb (CWA 2019). Santa Barbara County's average concentration of Cr^{+6} is 0.356 ppb (EWG 2019). Based on the Environmental Working Group (EWG) map, Cr^{+6} concentrations are alarming because it is 17.8 times higher than desired. Cr^{+6} can cause kidney damage, respiratory cancer, and dermatitis (OSHA n.d.). According to the City of Santa Barbara's 2019 Annual Water Quality Report, Cr^{+6} is considered as an unregulated contaminate with an MCL and PHG that is not defined. These two sources are conflicting because as one states an established value for PHG, the other does not. If both the EWG and Santa Barbara City Reports are based on the California Water Boards, they should have consistent information, but in reality, have conflicting

information. This leads to questioning: do chromium and hexavalent chromium pose a concern for Santa Barbara County's drinking water?

Based on the California State Water Resources Control Board, the Superior Court of Sacramento County issued a judgement invalidating the Cr^{+6} MCL because it is not economically feasible. Since 2017, California's MCL for Cr^{+6} is no longer in effect, so the Water Boards are following the total chromium 100 ppb MCL regulation encompassing both Cr^{+3} and Cr^{+6} (CWB 2019). This is why the CCR currently considers Cr^{+6} an unregulated contaminant. Federally, the Environmental Protection Agency (EPA) assumes that a measurement of total chromium is 100% Cr^{+6} to ensure that the greatest potential risk assessment (2019). In contrast, Cr^{+3} is an essential nutrient that does not pose health risks unless there is a deficiency or overdose in a human's diet. To ensure human health, Santa Barbara County should clearly distinguish and monitor the various forms of chromium because Cr^{+3} and Cr^{+6} have different toxic thresholds. Given that the federal water quality standard is 100 ppb and state is 10 ppb for Cr^{+6}, there is a huge discrepancy in how the government monitors potential human health effects. Even though the EPA assumes that total chromium measurements are based on Cr^{+6} concentrations, Santa Barbara County should abide by the state PHG and distinguish the differences between chromium forms because Cr^{+6} is more toxic at lower levels than Cr^{+3}.

Despite having conflicting restrictions on chromium MCLs, the County of Santa Barbara should be concerned with Cr^{+6} concentrations, separate from Cr^{+3}. This is because Cr^{+3} is an essential nutrient for humans, whereas Cr^{+6} can cause various health effects at a low concentration. Because there is a discrepancy in federal and state rules, there is confusion surrounding when citizens are ingesting unsafe concentrations of Cr^{+6}. Hence, Santa Barbara

County should enforce separate chromium MCLs so that water boards are consistent with regulating and providing safe water for its residents.

References

California Water Boards (CWB). (2019). Chromium-6 Drinking Water MCL. Retrieved November 11, 2019, from https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Chromium6.html.

City of Santa Barbara. (2019). The Importance of Planning & Diversifying Our Water Supply. Annual Water Quality Report. Retrieved November 11, 2019, from https://www.santabarbaraca.gov/civicax/filebank/blobdload.aspx?BlobID=220290%20.

Clean Water Action (CWA). (2019). The Dangers of Hexavalent Chromium (Chromium 6) in California Drinking Water. Retrieved November 11, 2019, from https://www.cleanwateraction.org/features/dangers-hexavalent-chromium-chromium-6-california-drinking-water.

Environmental Protection Agency (EPA). (2017, April 24). Chromium in Drinking Water. Retrieved November 10, 2019, from https://www.epa.gov/dwstandardsregulations/chromium-drinking-water.

Environmental Working Group (EWG). (2019). Is the toxic 'Erin Brockovich' chemical in your drinking water?. Retrieved November 11, 2019, from https://www.ewg.org/interactive-maps/2016-chromium6-lower-48.php#.WZ90eVF97ic.

Occupational Safety and Health Administration (OSHA). (n.d.). Hexavalent Chromium. Retrieved November 11, 2019, from https://www.osha.gov/SLTC/hexavalentchromium/healtheffects.html.