

The Gold Rush and its Impact to San Francisco's Bay Area

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Perhaps there was no other material discovery that shaped a city, its surroundings (and subsequent formation of a State) than that of the 1848 discovery of gold, in the western foothills of the Sierra Nevada. Some historians suggest that the Civil War had the greatest impact on American society. This may have been largely true in the east, but the Civil War's impact was somewhat less felt in the far west. The discovery of gold, just slightly more than a decade earlier, impacted the entire nation but more importantly shaped society in San Francisco, the Bay Area, and California particularly in demographics, transportation, and economics. However, the Gold Rush also left behind environmental problems and contamination that lingers today, including silting of San Francisco Bay, fill – responsible for subsidence and liquefaction, and mercury and polycyclic aromatic hydrocarbon (PAH) pollution. For example, in the New Almaden mining area, southwest of San Jose, mine wastes have contaminated the Guadalupe River basin and lower San Francisco Bay with elemental mercury (Hg₀) and Hg(II), both of which are being biologically converted to toxic mono-methylmercury (MeHg). Although MeHg occurs in nanogram-per-liter (ng/L) concentrations in these surface waters, it may be biomagnified first in bottom sediments and then about 100,000 times in the food chain with fish tissues in the mg/kg range. This presentation is an excerpt of chapters published in the 2018 *Geology of San Francisco, California* a contribution to *Geology of the World Series* by the Association of Engineering Geologists (AEG) at their 61st annual meeting and the International Association of Engineering Geologist (IAEG) 13th Congress in San Francisco – September 6-18, 2018.

Biography: **William E. (Bill) Motzer** is a registered California Professional Geologist (PG) and Certified Hydrogeologist (CHG), with PG registrations in five other states, and a certified professional geologist (CPG) with the American Institute of Professional Geologists (AIPG). Bill has more than 30 years' experience in conducting surface and subsurface water quality chemistry and environmental forensic investigations throughout California and other western states. His expertise also includes using stable isotopes in forensic geochemical investigations. Although now somewhat retired he still consults, loves hiking/leading hikes and geology field trips for organizations such as the Contra Costa Hills Hiking Club (CCHG), Northern California Geological Society (NCGS), and Professional Environmental Marketing Association (PEMA). He is a past President of the San Francisco Bay Branch of the Groundwater Resources Association of California, past Chair of the Northern California section for the Society for Mining, Metallurgy & Exploration (SME), and currently is contributing editor to the California section of the American Chemical Society's (ACS) newsletter – *The Vortex* (www.calacs.org), for which he writes a monthly column on various chemical and geochemical topics.