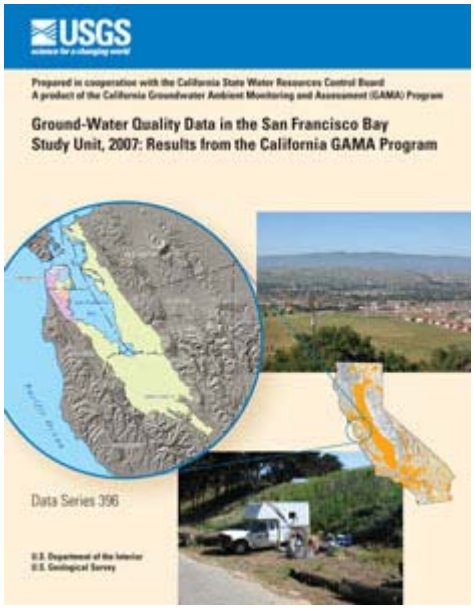
Prepared in cooperation with California State Water Resources Control Board

Ground-Water Quality Data in the San Francisco Bay Study Unit, 2007: Results from the California GAMA Program

By Mary C. Ray, Justin T. Kulongoski, and Kenneth Belitz

ABSTRACT



Ground-water quality in the approximately 620-square-mile San Francisco Bay study unit (SFBAY) was investigated from April through June 2007 as part of the Priority Basin project of the Ground-Water Ambient Monitoring and Assessment (GAMA) Program. The GAMA Priority Basin project was developed in response to the Groundwater Quality Monitoring Act of 2001, and is being conducted by the U.S. Geological Survey (USGS) in cooperation with the California State Water Resources Control Board (SWRCB).

The study was designed to provide a spatially unbiased assessment of raw ground-water quality, as well as a statistically consistent basis for comparing water quality throughout California. Samples in SFBAY were collected from 79 wells in San Francisco, San Mateo, Santa Clara, Alameda, and Contra Costa Counties. Forty-three of the wells sampled were selected using a spatially distributed, randomized grid-based method to provide statistical representation of the study unit (grid wells). Thirty-six wells were sampled to aid in evaluation of specific water-quality issues (understanding wells).

- **Report** PDF (4.5 MB)

For additional information contact:
Director, California Water Science Center
U.S. Geological Survey
6000 J Street, Placer Hall
Sacramento, California 95819
http://ca.water.usgs.gov/

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The ground-water samples were analyzed for a large number of synthetic organic constituents (volatile organic compounds [VOC], pesticides and pesticide degradates, pharmaceutical compounds, and potential wastewater-indicator compounds), constituents of special interest (perchlorate and N-nitrosodimethylamine [NDMA]), naturally occurring inorganic constituents (nutrients, major and minor ions, trace elements, chloride and bromide isotopes, and uranium and strontium isotopes), radioactive constituents, and microbial indicators. Naturally occurring isotopes (tritium, carbon-14 isotopes, and stable isotopes of hydrogen, oxygen, nitrogen, boron, and carbon), and dissolved noble gases (noble gases were analyzed in collaboration with Lawrence Livermore National Laboratory) also were measured to help identify the source and age of the sampled ground water.

Quality-control samples (blank samples, replicate samples, matrix spike samples) were collected for approximately one-third of the wells, and the results for these samples were used to evaluate the quality of the data for the ground-water samples. Assessment of the quality-control information from the field blanks resulted in applying “V” codes to approximately 0.1 percent of the data collected for ground-water samples (meaning a constituent was detected in blanks as well as the corresponding environmental data). See the Appendix section “Quality-Control-Sample Results.”

This study did not attempt to evaluate the quality of water delivered to consumers; after withdrawal from the ground, water typically is treated, disinfected, and (or) blended with other waters to maintain acceptable water quality. Regulatory thresholds apply to treated water that is delivered to the consumer, not to raw ground water. However, to provide some context for the results, concentrations of constituents measured in the raw ground water were compared with regulatory and non-regulatory health-based thresholds established by the U.S. Environmental Protection Agency (USEPA) and California Department of Public Health (CDPH) and thresholds established for aesthetic concerns (secondary maximum contaminant levels, SMCL-CA) by CDPH.

VOCs were detected in about one-half of the grid wells, while pesticides were detected in about one-fifth of the grid wells. Concentrations of all VOCs and pesticides detected in samples from all SFBAY wells were below health-based thresholds. No pharmaceutical compounds were detected in any SFBAY well. One potential wastewater-indicator compound, caffeine, was detected in one grid well in SFBAY. Concentrations of most trace elements and nutrients detected in samples from all SFBAY wells were below health-based thresholds. Exceptions include nitrate, detected above the USEPA maximum contaminant level (MCL-US) in 3samples; arsenic, above the USEPA maximum contaminant level (MCL-US) in 3 samples; cadmium, above the MCL-US in 1 sample; boron, above the CDPH notification level (NL-CA) in 2 samples; and strontium, above the USEPA lifetime health advisory level (HAL-US) in 2

samples. The radioactive constituent radon-222 was detected above the proposed MCL-US in two grid wells, but no wells had detections above the proposed alternative MCL-US. Most of the samples from all SFBAY wells had concentrations of major ions, total dissolved solids, and trace elements below the non-enforceable thresholds set for aesthetic concerns. Six or fewer samples contained chloride, sulfate, or iron at concentrations above the SMCL-CA thresholds. No microbial indicators were detected in SFBAY grid wells.

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