



Groundwater Ambient Monitoring and Assessment (GAMA) Program: California's Assessment of Groundwater Quality

California State Water Resources Control Board

GAMA PROGRAM OVERVIEW

California's groundwater comprises up to 40 percent of the state's water supply. The citizens of California are increasingly concerned about groundwater quality. Since 1984, over 8,000 public supply wells have been abandoned, some due to the detection of chemicals such as MTBE, solvents, and perchlorate. To address these concerns, the state legislature required that the State Water Resources Control Board (State Water Board) develop a comprehensive ambient groundwater quality monitoring plan. To reach this goal, the State Water Board created the Groundwater Ambient Monitoring and Assessment (GAMA) Program. The GAMA Program has three components: Statewide Basin Assessments, Voluntary Domestic Well Assessment Project (Voluntary Project), and GAMA Special Studies. This poster will focus on Special Studies and the Voluntary project.

SPECIAL STUDIES

The GAMA Special Studies component addresses important and emerging statewide groundwater quality issues. Using innovative, cutting-edge technology, the GAMA Program is currently working with LLNL and UC Davis to conduct special studies on nitrate source attribution, dairies, wastewater indicators, and the detection of endocrine disrupting compounds (EDCs) in ambient water.

Recently Completed LLNL Special Studies

- Nitrate in California groundwater – sources, fate and transport
 - Central Valley dairies
 - Basins with nitrate management plans
 - Llagas – Gilroy
 - Chico
 - Basins with PSW MCL exceedances
 - OCWD
 - Livermore
 - Denitrification survey
- Wastewater Indicators in Groundwater
 - Private domestic wells
 - Dairy wells
 - Areas directly under the influence of recycled water irrigation
 - Gilroy
 - Livermore



Current Special Studies

- Technology transfer of analytical methods for trace organic compounds to commercial laboratories
- Field-based septic studies
- Water quality changes during groundwater banking
- Design and testing of a field gas extraction apparatus

Upcoming Special Studies

- History of well operation and DBP occurrence at public supply wells
- Fate and transport of reliable wastewater indicators (e.g., carbamazepine & metabolite)
- De-convolution of a mixed groundwater age at a public supply well (Dilution of a contaminant at a public supply well) – depth dependent sampling, modeling using NUFT, analysis of common contaminants
- Water quality and redox conditions: effects of irrigation and groundwater management



VOLUNTARY DOMESTIC WELL ASSESSMENT PROJECT

To inform citizens about their private domestic well water quality, the Voluntary Domestic Well Assessment Project (Voluntary Project) conducts a free voluntary well water testing program. In addition to providing well owners with specific water quality data, this testing effort will help us in the overall assessment of California groundwater quality.

The main objectives of the Voluntary Domestic Well Assessment Project (Voluntary Project) are:

- Assess the presence of various analytes in domestic wells, which are attributed to anthropogenic activities and from natural sources; and
- Assist the public in understanding water quality data and aspects affecting domestic wells.

Literature explaining water quality in domestic wells is provided to the well owner.

Location information as well as well owner identification is kept confidential. Water quality data is shared with the State water Board and the respective county cooperative agency.



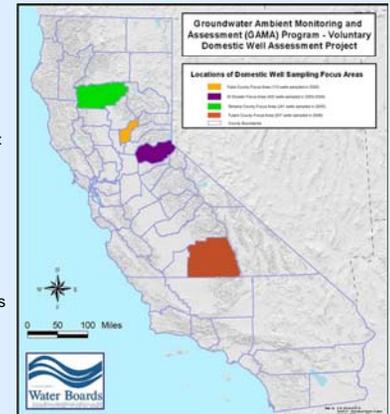
Brochures are mailed to domestic well owners in the selected focus county. Coordinating with the local county environmental management office, a randomized, spatially distributed grid is assembled onto an equal-area grid over the county.

Constituents Sampled

- Total and Fecal Coliform Bacteria
- General Minerals (e.g. Sodium, Bicarbonates)
- Inorganics (e.g. Lead, Arsenic, Nitrate)
- Organics (e.g. MTBE, PCE, TCE)
- Additional constituents may be chosen

Frequently Detected Constituents

- Nitrate
- Total and Fecal Coliform Bacteria
- Dibromochloropropane (DBCP)
- Metals
- Volatile Organic Compounds (VOCs)



Constituents Sampled in the Voluntary Project (above); Progress of the Voluntary Project (below)

PROGRESS	
2002:	Yuba County (119 wells sampled)
2003-2004:	El Dorado County (400 wells sampled)
2005:	Tehama County (241 wells sampled)
2006:	Tulare County (>200 wells sampled)

**For more information on the
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