

# **DESIGNING A FORENSIC STUDY TO IDENTIFY PERCHLORATE SOURCES AND PERCHLORATE BACKGROUND LEVELS IN THE LLAGAS GROUNDWATER SUBBASIN, SANTA CLARA COUNTY**

Thomas K.G. Mohr, Santa Clara Valley Water District

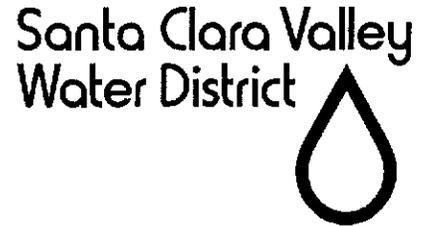
The Santa Clara Valley Water District has secured funding from US EPA to conduct a study of perchlorate sources in the Llagas Groundwater Subbasin in southern Santa Clara County. The study will determine the ability of isotopic and geochemical methods to distinguish anthropogenic from possible natural sources, and methods to distinguish contributions from different anthropogenic sources. A combination of spatial occurrence, regional flow patterns, source-water typing using isotopes of water, tritium-helium age-dating, basic geochemistry, marker chemicals, and compound-specific isotope analysis of perchlorate, nitrate, and strontium will be applied. EPA's Data Quality Objectives process is being applied, and a Project Advisory Committee comprised of leading technical experts has reviewed work plans and will review work products.

The study includes basin-wide sampling of wells for analysis of perchlorate at low-level reporting limits in an effort to determine whether a non-zero background concentration for perchlorate is present in the Llagas groundwater subbasin. Statistical analysis of spatial occurrence and control sampling of groundwater in nearby hydrologically disconnected alluvial deposits will be employed to derive a background concentration, if present. Origins of apparent background perchlorate will be checked using  $^{17}\text{O}$  isotopes as an indicator of potential atmospheric or fertilizer origin for perchlorate.

The study is expected to provide an informed estimate of the basin background level for perchlorate, and results from forensic testing may provide data to regulators and others for decisions on cost apportionment for treatment of perchlorate contamination in municipal wells. The Santa Clara Valley Water District will use the data collected to inform groundwater basin management decisions to secure long-term water supply reliability. This presentation will present the case history and profile design and forensics aspects of the study, which is underway.

**Thomas K.G. Mohr, P.G., E.G., H.G.**, is the Perchlorate Project Manager for the Santa Clara Valley Water District, where he works on two major perchlorate cases. Mohr is GRA's 2006/2007 President and has co-chaired three national perchlorate conferences for GRA, including Perchlorate 2006. Mohr's work in forensics includes stable isotopes for nitrate source apportionment at a landfill, isotopes to locate water invading a landfill gas system and identify sources of salinity in a deep coastal well, profiling solvent stabilizer packages for solvent source apportionment, and identifying sources and origins of perchlorate.

May 11, 2006



Mr. Roger Briggs, Executive Officer  
California Regional Water Quality Control Board  
Central Coast Region  
895 Aero Vista Drive, Suite 101  
San Luis Obispo, CA 93401

Subject: Clarification of Role of District's *Perchlorate Background and Source Study*

Dear Mr. Briggs:

The Santa Clara Valley Water District wishes to offer the following clarifications regarding aspects of the Regional Board's May 2<sup>nd</sup> letter to Morgan Hill City Manager Ed Tewes pertaining to the District's *Perchlorate Background and Source Study* (Study):

1. It is anticipated that the sampling and analysis phase of the Study will be completed at the earliest in summer of 2007. A variety of factors could require more time to complete the Study; however, we are optimistic that a draft report will be available by the end of 2007.
2. The geographic scope of the study is the entire Llagas groundwater subbasin; the Study will not focus only on the Morgan Hill area. The data collected could be useful for establishing a groundwater subbasin background level for perchlorate. It is also expected that application of isotope methods will be successful in differentiating anthropogenic from natural sources of perchlorate. The Study will attempt to distinguish different anthropogenic sources of perchlorate; however, there are a number of factors that could complicate the interpretation of forensic data to allow definitive determination of one anthropogenic source vs. another. The expert panel convened to advise the Study will help to apply the most robust methods available, but the District cannot at this point assure the Regional Board that the Study will answer all the questions discussed in the May 2<sup>nd</sup> letter.

The District is at this time committed to perform a scientific study of perchlorate background and sources for the entire Llagas groundwater subbasin provided that funding and resources remain available. The Study will follow EPA's quality protocols, and is subject to approval by EPA's Quality Assurance Officer.

Sincerely,

**ORIGINAL SIGNED BY**

Behzad Ahmadi, P.E.  
Manager, Groundwater Management Unit

Cc: Ed Tewes, City of Morgan Hill  
Melanie Richardson, Walt Wadlow, Thomas Mohr