**Position Title: Groundwater Quality Cooperative Extension Specialist**

**Position:** (1) The focus of this CE Specialist position is on extension, outreach, and research to address important groundwater quality issues and challenges in California, particularly in rural and agricultural regions. (2) The successful candidate is expected to have a Ph.D. in hydrology, environmental sciences, environmental engineering, water chemistry, or chemistry, with a strong research background in aqueous geochemistry, analytical chemistry, subsurface contaminant fate, transport, and remediation, and ideally some experience with hydrogeochemical modeling of subsurface environments. The candidate will demonstrate teaching and leadership skills useful for developing a successful outreach and extension program. (3) The position will be in the Department of Land, Air, and Water Resources (LAWR). The department has close relationships with analytical laboratory facilities offering a wide range of analytical capabilities for geochemical analyses, including bulk and molecular organic matter (biomarkers), stable isotopes, and inorganic (e.g., metals) and organic environmental contaminants (e.g., pesticides, pharmaceuticals). Other resources such as advanced computing, and soil and plant testing are also available. The Specialist will work in collaboration with agricultural stakeholder groups, farm advisors and campus academics, UC ANR strategic initiatives (water, sustainable foods, healthy families & communities), NGOs, and with local, regional, state, and federal agencies.

**Justification:** Groundwater is a critical resource in the state of California, and particularly in agricultural and rural areas. Domestic and most rural public water supply systems rely on healthy, high quality groundwater for drinking water. California’s agricultural production relies on high quality, low salinity groundwater for about half of its irrigation water. Groundwater contamination from fertilizer (nitrate), pesticides, natural contaminants (e.g., arsenic, chromium, selenium, uranium), emerging contaminants in land application of urban or animal wastes (pharmaceuticals and personal care products, others) and salinization threaten the quality of groundwater supplies in rural and agricultural regions, with potentially costly long-term impacts on California's economy. Increased management of groundwater recharge further heightens demand for groundwater quality expertise. Many economically disadvantaged communities struggle with drinking water solutions, where groundwater has become contaminated. The need for clean groundwater will only increase with intensification of agriculture and with urbanization of California’s rural regions. Agricultural stakeholders, local groundwater sustainability agencies, rural households, planners and land use decision makers rely on science-based information to assess water quality risks and make critical policy decisions. Better measurement, understanding, and assessment of groundwater quality, geochemical processes, and related contaminant issues in aquifers are needed to address these issues and to develop solutions, particularly for agricultural land uses. This position will have significant impact on and significantly support the implementation of new nonpoint source pollution and groundwater management regulations (irrigated lands regulatory program, ag regulatory programs, salinity and nutrient management plans, groundwater sustainability plans) affecting growers, food processors, rural communities, and animal farms; and also facilitate community water supply solutions with respect to, e.g., nitrate, arsenic, chromium, and uranium, and others, including intentional recharge operations;

**Extension:** The successful candidate will be expected to develop a cooperative extension program that provides education and decision support on groundwater quality, groundwater recharge, subsurface geochemical processes, and on occurrence and fate of contaminants. The extension program would support agricultural stakeholders and their water quality coalitions, local groundwater sustainability agencies, nitrate and salt management zones soon to be developed in the Central Valley, other local, regional, state, and federal planning and regulatory agencies and decision makers, and communities in understanding, evaluating, and protecting groundwater quality. It will apply research to develop promising solutions to assessing and addressing groundwater quality threats to drinking water and agricultural production. The extension program is also expected to provide outreach to economically disadvantaged communities and domestic well owners to assess and address groundwater quality issues. Extension modes include organization/participation of/in workshops, conferences, technical advisory committees, electronic media dissemination and others.

**Research**: To complement outreach activities, the Specialist will implement a cutting-edge research program focused on measuring, understanding, and monitoring hydrogeochemical processes within a wide range of geologically heterogeneous and geochemically complex California aquifer system settings. Research will be relevant to emerging groundwater quality issues in rural and agricultural regions of the State. This may include assessment of irrigation and nutrient management practices in annual and perennial cropping systems, from animal farming, or from municipal areas specifically to improve groundwater quality issues; better understanding of occurrence of natural groundwater contamination and development of management approaches; determination of the impact of soil leachates and contaminants where groundwater recharge is practiced; mapping of denitrification and salinization potential; developing contaminant monitoring systems at local or regional scales; and developing appropriate remediation/remedial systems. Research would interface and support new state and regional regulatory and planning programs concerning nonpoint sources, rural community wastewater systems, irrigation wells, and rural and domestic drinking water systems. Research will contribute to a wide range of scientific journals (e.g., Env. Sci. and Technology, Agriculture, Ecosystems and Environment, Water Resources Research, J. Contam. Hydrol., California Agriculture) but also be disseminated through ANR publications and stakeholder-oriented white papers, blogs, and other electronic media.

**ANR Network:** The existing UC network of CE specialist, AES, and county CE faculty involved in watershed/groundwater/unsaturated zone related activities, or engaged in rural community and agricultural commodity related research that may impact or be impacted by groundwater quality (community development, irrigation and water management, nutrient management, food safety, and others) provides broad opportunities for research and extension collaborations. This position would readily complement existing UC ANR programs by adding critical expertise in groundwater hydrogeochemistry and related analytical chemistry, which is currently missing from UC Cooperative Extension. The position would also work closely with existing faculty focused on analytical methods and with analytical laboratory facilities at UC Davis or other campuses.

**Network External to ANR**: State and Regional Water Boards are driving new water quality compliance performance in agriculture, food processing, and urban stormwater management. Potential external collaborators include staff at Regional Water Boards, Lawrence Livermore and Lawrence Berkeley National Laboratories, U.S. Geological Survey, a wide range of groundwater consulting companies, but also industry groups including agricultural coalitions and commodity boards, local groundwater sustainability agencies and salt-nutrient management planning agencies, and NGOs that will be tasked with developing, implementing, and monitoring management practices that are protective of groundwater resources.

**Support:** The Department of Land, Air, and Water Resources will provide office and laboratory space and administrative support, consistent with that assigned to other departmental faculty members. In addition, the new specialist will receive base funding support annually, again consistent with those provided to other faculty, to help cover the costs of office supplies, computing, internet and telephone access and research.

**Other support:** For better understanding, monitoring, or assessment of groundwater quality and hydrogeochemical processes related to rural/agricultural activities, extramural funding sources may include federal agencies (US Department of Agriculture, US Environmental Protection Agency, US Geological Survey, National Institutes of Health), state agencies such as the Department of Food & Agriculture, CalEPA (State Water Resources Control Board, Department of Pesticide Regulation, Department of Toxic Substances Control, Regional Water Boards), various agricultural commodity boards and agricultural coalition groups (ILRP, CV-SALTS, Dairy CARES), and community organizations.

**Location:** UC Davis has a strong emphasis on water and environmental sciences with a wide range of interdisciplinary expertise on water and water quality issues. Graduate groups in hydrologic sciences, soils and biogeochemistry, and agricultural and environmental chemistry readily provide a highly trained pool of students to support research. Davis is also close to the state capital, where lawmakers and state agency personnel frequently look for direct support and advise on water quality related regulations and policy.

**Developed and proposed by:** This proposal has been developed through discussions in the UC ANR Water Strategic Initiative, among LAWR faculty, and in discussions with commodity groups, NGOs, and state agencies.