

1. Project Title: Detection of septic system waste in the groundwater of Beaumont CA using chemical and isotopic tracers

2. Organization Proposing the Project:

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3. Project Description:

Septic systems contain a large suite of inorganic and organic substances, some of which have only recently been recognized as having negative effects on human health and the environment. These emerging contaminants can be extremely toxic at low levels and produce effects on the endocrine systems of higher organisms. In the proposed study, samples will be collected from groundwater wells in and around the City of Beaumont CA, in a synoptic survey. Additional samples of surface water in the region (urban and natural streams, agricultural drainage) and septic fluids may be co-collected. The samples will be used to determine concentrations of chemical and isotopic constituents that are diagnostic of the presence of septic wastewater in groundwater. These constituents include major cations, major anions, nutrients, isotopes of nitrate ($\delta^{15}\text{N}$ and $\delta^{18}\text{O}$) and emerging pharmaceutical, pesticide, and food additive contaminants. Using these diagnostic tracers and results from modeling of groundwater movement using MODFLOW 96, the investigators will assess the threat of septic systems to groundwater quality in the study region.

4. Total Project Cost: \$105,450 (see attached task budget)

5. Project schedule: Start Date: June 10, 2010. End Date December 1, 2011

	Jun '10	Jul '10	Aug '10	Sep '10	Oct '10	Nov '10	Dec '10	Jan '11	Feb '11	Mar '11	Apr '11	May '11	Jun '11	Jul '11	Aug-Dec '11
Task 1: Publication review	X	X													
Task 2: Water sampling			X	X	X										
Task 3: Inorganic analyses				X	X	X	X								
Task 4: Isotope analyses				X	X	X	X	X	X	X					
Task 5: Organic analyses				X	X	X	X	X	X	X	X				
Task 6: Modeling.									X	X	X	X			
Task 7: Report													X	X	X
Task 8 Project Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

6. Expected Products: Products of the study include a database on groundwater quality in and around the City of Beaumont, CA. A final report, which synthesizes groundwater modeling with new chemical data will be produced for the Regional Board.

Task Budget

Task	Description	Cost
1	Review of existing publications on groundwater resources in Beaumont region. Selection of wells and surface water sampling sites. Development of detailed Sampling and Analysis Plan and a Quality Assurance Project Plan.	\$5,000
2	Water sampling. Travel between Riverside and Beaumont for collection of water samples. Sample containers, filters, coolers, dry ice etc.	\$5,023
3	Analysis of water samples for: Cations, anions, and nutrients	\$6,000
4	Analysis of water samples for NO ₃ isotopes ($\delta^{15}\text{N}$ and $\delta^{18}\text{O}$) using microbial denitrifier method	\$5,250
5	Analysis of water samples for emerging contaminants which may include: acetaminophen, diuron, bisphenol-A, caffeine, carbamazepine, DEET, 17 α -ethynylestradiol, gemfibrozil, ibuprofen, sulfamethoxazole, TCEP	\$30,483
6	Modeling of groundwater using MODFLOW 96	\$16,000
7	Report preparation	\$13,940
8	Project Management and Administration	\$10,000
	Total Direct Costs	\$91,696
	Indirect costs (15% of direct costs)	\$13,754
	Total Project Costs	\$105,450