ATTACHMENT A1

Cost Allocation

Required Cost Allocation for Years 1, 2, 3, and 4 and Possible Cost Allocation for Year 5**

Study Year	SCWA	Santa Rosa	Rohnert Park	Sebastopol	Cotati	Windsor	Cal American	County of Sonoma	TOTALS
Original Agreement Year 1 (10/05-09/06)	$100,000 *	$30,611	$25,839	$5,220	$7,551	$8,256	$12,660	$10,000	$200,137
First Amended Agreement Year 2 (10/06-09/07)	$159,800	$59,584	$50,295	$10,160	$14,697	$16,070	$12,660	$10,000	$333,266
Year 2 (Supplemental)	$28,771	$10,727	$9,055	$1,829	$2,646	$2,893	$2,279	$1,800	$60,000
Proposed Year 3 (10/07-09/08)	$159,800	$68,687	$57,980	$11,712	$16,943	$18,525	$12,660	$10,000	$356,307
Estimated Year 4 (10/08-09/09)	$159,800	$54,043	$45,618	$9,215	$13,330	$14,576	$12,660	$10,000	$319,242
Estimated Year 5 (10/09-09/10)	$159,800	$12,879	$10,872	$2,196	$3,177	$3,474	$12,660	$10,000	$215,058
Total Cash Funding	$767,971	$236,531	$199,659	$40,332	$58,344	$63,794	$65,579	$51,800	$1,484,010

Notes:

* - Provided as $50,000 in cash and $50,000 as in-kind services for initial preparation of geographical information system (GIS) database.

** - Cost allocation based on a total study cost of $2,168,000 with $1,484,010 paid by co-funding agencies and $685,000 in matching federal funding.

ATTACHMENT A2

USGS Cooperative Study of the Groundwater Resources of the Santa Rosa Plain
Review of work completed in Federal Fiscal Year 2009
Authored and submitted by USGS January 2009

The United States Geological Survey (USGS) cooperative study of the groundwater resources of the Santa Rosa Plain has four major tasks: data compilation, data collection, data interpretation and geohydrologic characterization, and groundwater flow modeling. Progress on these four tasks during federal fiscal year (FFY) 2008 is summarized below.

Data Compilation

Over the past year, USGS hydrologists further refined the base map, compiled stakeholder data, and integrated water-quality data from multiple sources (including USGS, California Department of Water Resources [DWR], and stakeholders). One major area of work has been analyzing land use data (geo-referencing, digitizing, coding, and quality assuring); Sonoma County Water Agency (Agency) staff has completed much of this work. The processing of land use data is complete for all five available years (1959, 1975, 1979, 1986, and 1999). Land use information is very important, because it is used to estimate pumpage for the groundwater model. A second major area of work has been inputting well construction information data from the DWR WELLMA database. There are records for 9,806 wells (472 of which are identified as irrigation wells) in the study area, which have been entered into the project database.

The water chemistry database for the study contains approximately 4,000 records of inorganic, trace element, nutrient, and miscellaneous chemistry parameters for about 250 wells and a dozen surface-water sites located within the Santa Rosa drainage basin. This database is currently being updated with recently obtained, proprietary records, from California Department of Public Health (DPH) dating back to 2004. Post 2005 records are also being sought for water quality sites monitored by the DWR. These additional records will enable up-to-date trend analysis of water quality conditions in the Santa Rosa Plain. Water level data for approximately 100 wells from DWR have been entered into the project GIS. Of these wells, 65 have more than 20 years of data (going back as far as the 1940s), and 30 wells were active in 2006. Forty of the wells are shallow (less than 100 ft deep).

Other data compiled in the past year include measured pumpage and well logs. As part of the preliminary watershed (recharge) model, data sets on the physical characteristics of the watershed (DEM, hydrography, vegetation, soils, geology, land use), hydrology (e.g. streamflow), and meteorology (e.g. precipitation) have been assembled.

New Data Collection

In October 2007, USGS geologists collected geophysical data along two profiles in the City of Santa Rosa. Preliminary processing and interpretation of the data has been completed. The results of the geophysical data provide valuable information regarding the location and structure of the Rodgers Creek Fault Zone and potential implications for constraints on aquifer geometry. These data confirm the presence of the Trenton Ridge and indicate that the aquifer is not horizontal at depth, but dips off the concealed basement ridge.

As part of the ongoing USGS Groundwater Ambient Monitoring and Assessment (GAMA) program, the USGS has conducted follow-up sampling at 6 wells within the Santa Rosa Plain. Samples from these wells are being analyzed for pH, dissolved oxygen, alkalinity, VOCs, stable isotopes, pesticides, major ions, nutrients, arsenic, iron, perchlorate, tritium and noble gases, and isotopes of carbon, boron, and strontium.

Data interpretation and geohydrologic characterization

Water level analyses have included preparation of contour maps and hydrographs for individual wells. USGS hydrologists are completing an assessment of temporal trends, correlation with precipitation, and determination of vertical head differences.

USGS geologists developed a three dimensional (3D) geologic framework model of the Santa Rosa Plain. Development of this framework model had three main steps: 1) revising stratigraphic surfaces for the principal units in the study area (Glen Ellen Formation and equivalents; Wilson Grove Formation, Sonoma Volcanics, Petaluma Formation, and undivided basement rocks); 2) converting the 3D model of lithology to a 3D model that portrays a limited number of textural (grain size) classes; and 3) imprinting the stratigraphic and textural information on arrays of grid cells for input into the MODFLOW groundwater flow model.

Groundwater flow modeling

Much of the work described above will play an important role in the development of the groundwater flow model. For example, the data compilation of land use and well construction is essential for estimating the 3D distribution of historic pumpage for the model. Similarly, the geologic and lithologic characterization will form the basis for the initial model layering and assignment of hydraulic properties. USGS scientists have now developed methodology to import these 3D geologic data into the groundwater model.

A very important component of the groundwater model is the representation of natural recharge. There are several alternate approaches for doing this: estimating recharge based on precipitation records or surrogates; simulating recharge using a watershed model and use as input for groundwater flow model; or a coupled approach. We have chosen to apply the coupled approach, through the use of GSFLOW, which combines MODFLOW2005 with the Precipitation Runoff Modeling System (PRMS). PRMS simulates land surface hydrologic processes (evapotranspiration, runoff, infiltration, and interflow). The main advantage of combining PRMS with MODFLOW in GSFLOW is that it provides an improved representation of spatially distributed climate, land surface processes (overland flow, retention storage, snow melt, and interception storage) and soil zone processes (evapotranspiration, through flow, and recharge).