



1755 Creekside Oaks Drive, Suite 200  
Sacramento, California 95833  
tel: +1 916 567-9900  
fax: +1 916 564-5016  
cdmsmith.com

February 27, 2015

San Joaquin Valley Drainage Authority (SJVDA)  
c/o Joseph C. McGahan  
Summers Engineering  
P.O. Box 1122  
887 N. Irwin St.  
Hanford, CA 93232

Subject: **Final Scope of Work, Schedule and Budget for Surveillance and Monitoring Program Project**

Dear Mr. McGahan:

Thank you for the opportunity to develop the Surveillance and Monitoring Program (SAMP) on behalf of the Central Valley Salinity Alternatives for Long Term Sustainability (CV-SALTS). To support preparation of a project contract, please find attached the following final documents: Scope of Work (Attachment 1); Project Schedule (Attachment 2); and Project Budget (Attachment 3). These final documents incorporate the outcome of the discussions that occurred during the teleconference held on February 26, 2015.

We look forward to working with CV-SALTS on the execution of this project. Please let me know if you have any questions regarding the attached documents or require any additional information to support development of the project contract. As needed, please contact me at your convenience via email at [meyerhoffrd@cdmsmith.com](mailto:meyerhoffrd@cdmsmith.com) or by telephone at 303-345-3083.

Very truly yours,

A handwritten signature in black ink, appearing to read "Richard Meyerhoff".

Richard Meyerhoff, Ph.D.  
Vice President  
CDM Smith Inc.



---

## Surveillance and Monitoring Program

### Attachment 1. Scope of Work

The key objectives for the CV-SALTS Surveillance & Monitoring Program (SAMP) include:

- Develop a monitoring program that will allow for statistically-defensible Ambient Water Quality (AWQ) determinations and trend analyses. The SAMP, as part of the Salt and Nitrate Management Plan (SNMP), is designed to fulfill the monitoring requirements of the planned Basin Plan Amendment (BPA) and support its adoption and approval. In this regard, SAMP development will consider the following:
  - Focus on the data necessary for the determination of AWQ, programmatic updates of AWQ, and trend analyses. The goal of SAMP is value added monitoring to provide the requisite data to inform management and regulatory decisions and implementation strategies. The SAMP must be connected intelligently to decision-making processes.
  - Be robust and dense enough both spatially and temporally to make the AWQ determinations in a complex hydrologic and hydrogeological environment.
  - Collect ancillary data required to estimate the volume-weighted ambient groundwater quality, including groundwater elevations.
  - Incorporate monitoring stations associated with planned recycled water projects, including indirect potable reuse projects.
  - The monitoring well network will be refined in or near the capture zone of potable supply wells.
  - Sample stations for both groundwater and surface water may be added to the SAMP where appropriate and where there is connectivity between the two.
- Develop a monitoring program that is cost-effective. In this regard, SAMP development will consider the following:
  - Utilize existing monitoring programs and existing monitoring stations in order to be cost-effective and consistent.
  - The SAMP may not have the same level of detail and intensity throughout the Central Valley. Areas that can be identified as low-vulnerability areas, Initial Analysis Zones (IAZs) in the northern Sacramento River Basin or small groundwater basins outside the valley floor for example, may not warrant a spatially or temporally dense monitoring program. Likewise, areas of high-vulnerability also may not require a dense monitoring program, unless active mitigation measures are proposed. The SAMP could be focused on compliance areas and areas where groundwater quality is more susceptible to changes – increases or decreases in concentrations of constituents of concern.
  - The determination of volume-weighted ambient groundwater quality is relatively expensive and may only be required at a less frequent interval – this is being conducted as part of other CV-SALTS efforts. Temporal trends can be monitored on a more frequent basis by analyzing time-series data for a network of key or indicator wells.

---

With the above objectives to guide the project, CDM Smith will execute the following Scope of Work to prepare the SAMP:

### Task 1. Project Set-up and Management

CDM Smith will perform all project management services SAMP, including resource allocation and scheduling, cost controls, monthly invoice preparation and review, and the preparation of monthly status reports. CDM Smith will lead and/or participate in the following meetings:

- **Project Kick-off Meeting.** This meeting will be conducted by conference call and will take place within two weeks of the notice-to-proceed (NTP).
- **CDM Smith Technical Review Committee (TRC) Meetings.** Internal CDM Smith TRC meetings are planned at the start of Tasks 6 and 9 (The project kickoff meeting is coincident with the start of Task 2).
- **CV-SALTS Project or Ad-hoc Committee.** The purpose of this committee is to conduct a preliminary internal CV-SALTS review of CDM Smith deliverables. CDM Smith will coordinate with this committee through the direction of the CV-SALTS Technical Project Manager, Roger Reynolds.
- **CV-SALTS Technical Advisory Committee (TAC) Meetings.** CDM Smith will present progress updates to the TAC and seek feedback; TAC meetings are scheduled at the completion of Tasks 2 and 6. It is anticipated that the Task 6 meeting will be a face to face meeting, while the Task 2 meeting would be conducted through on-line conferencing. The specific timing and content of these meetings will be coordinated with the CV-SALTS Technical Project Manager, Roger Reynolds.

### Task 2. Identify Existing Monitoring Programs/Stakeholders

CDM Smith will collect, compile, and review applicable reports and data that are relevant to this project. Copies of key documents will be made available to the CV-SALTS stakeholders through the CV-SALTS website. The bibliography of reports will be a work-in-progress and will be updated regularly over the course of the development of the SAMP through coordination with Daphne Orzalli; it is anticipated that many relevant reports and data have already been compiled during the development of the Initial Conceptual Model (ICM) for CV-SALTS. CDM Smith will work with CV-SALTS and the ICM consultant to determine the extent to which data and reports have been compiled.

CDM Smith will compile reports and data from the Central Valley Regional Water Quality Control Board (CVRWQCB)-mandated monitoring programs, including those associated with Waste Discharge Requirements (WDRs), Cease and Desist Orders (CDOs), Cleanup and Abatement Orders (CAOs), and National Pollutant Discharge Elimination System (NPDES) permits. WDRs may include the Central Valley Dairy Representative Monitoring Program, the Monitoring Reporting Program for the Irrigated Lands Regulatory Program, the Rice-Specific Groundwater Quality Assessment Report (GAR), the East San Joaquin Water Quality Coalition GAR, the San Joaquin County and Delta Water Quality Coalition's GAR, and the Westside San Joaquin River Watershed Coalition's GAR. Groundwater management plans and groundwater assessment reports will also be compiled and reviewed. Various reports and data from state and federal agencies, including the SWRCB's Ground-Water Ambient Monitoring and Assessment

---

(GAMA) Program, the California Department of Water Resources (DWR), the US Bureau of Reclamation, will also be incorporated into the SAMP.

Groundwater elevation data will be obtained from these programs, to the extent possible, as well as from the ICM database. Relevant groundwater elevation data will also be downloaded from the DWR's California Statewide Groundwater Elevation Monitoring (CASGEM) program.

To the extent possible, monitoring station information will be uploaded into the SAMP geographic information system (GIS) for analysis in terms of areal distribution, depth and the aquifer zone that the well is screened in, analytes, and frequencies of sample collection and water level measurements.

### **Task 3. Identify Constituents of Concern**

The SAMP Technical Memorandum, the final deliverable for this project, will discuss potential constituents of concern (COCs) that will be included in the SAMP along with the rationale or basis for inclusion in the program. TDS and all major cations and anions (calcium, magnesium, sodium, potassium, chloride, sulfate, bicarbonate, and carbonate) will be included by definition as well as relevant forms of nitrogen (nitrate, nitrite, Total Kjeldahl Nitrogen, ammonia). Other ions may be included – to the extent they are available – to allow for a cation/anion balance check as part of the project quality assurance plan. An important consideration will be to develop a geochemistry-based screening protocol for evaluating data quality prior to uploading of the data to the Relational Database Management System (RDBMS)/GIS framework developed for this project, in order to ensure that only data of sufficient quality are used in the statistical analyses. The screening protocol to be developed in the SAMP will include a number of data quality assessment measures, such as the following standard geochemical indicators: (a) specific conductance and TDS ratio; (b) TDS and sum of total cations and anions; (c) cation-anion balance; (d) duplicate analyses; (e) forms of redox-sensitive elements (e.g., nitrogen) versus redox potential (Eh); (f) total alkalinity and carbonate/bicarbonate versus pH; and (g) identification of outliers.

Trace constituents of concern (for example, selenium, boron, vanadium, uranium) may be identified by reviewing results from existing monitoring programs and will be included in the SAMP as appropriate and as data allows. Note that analyses for trace constituents will be management zone-based; specific to the area where they are a potential concern.

Monitoring for contaminants of emerging concern (CECs) may be included in the SAMP in areas where recycled water recharge projects are being conducted or are planned. However, it is expected that these CECs would be sampled and analyzed by the project proponents of the Groundwater Replenishment Reuse Projects (GRRP).

### **Task 4. Incorporate Management Zone Delineations in the SAMP**

CV-SALTS is currently developing a Management Zone framework archetype and any delineated management zone area will be incorporated into the SAMP. The SAMP domain is the Central Valley as a whole, but local SAMPs and SNMPs can be developed for newly-defined management zones. If local SNMPs are developed using management zones, these SNMPs could readily be incorporated into the SAMP, so that the monitoring programs will address local conditions and management strategies.

---

#### **Task 5. Identify Existing and Planned Recharge Projects and Potable Supply Wells**

In this task and to the extent possible, locations of existing and planned municipal water supply wells and existing and planned GRRP projects will be ascertained and uploaded to the SAMP GIS. Locations of potable supply wells will be obtained from the ICM database and locations of existing or proposed GRRP projects will be obtained through the CVRWQCB. The GRRP regulations mandate monitoring wells in proximity to the recycled water recharge basins. The data generated from these monitoring wells will be incorporated into the SAMP. Likewise, the data generated from potable supply wells and sentry wells will also be incorporated into the SAMP.

#### **Task 6. Define the Required SAMP and Identify Data Gaps**

To the extent the data will allow, CDM Smith will conduct spatial statistical analyses on the compiled SAMP database. The spatial analyses will determine the following: (a) The randomness, regularity and aggregation (clustering) characteristics of the network of mapped well locations; and (b) the geostatistical characteristics (variance as a function of separation distance) of the most critical continuous and regionalized variables, nitrate and TDS. The results of the spatial statistical analyses will be used to select a subset of the mapped well locations to be used for the SAMP. The SAMP monitoring well network will be selected to provide adequate coverage while minimizing unnecessary aggregation or overlaps. The results will also be used to identify any subareas within the selected monitoring well network with inadequate coverage or data gaps, which would need to be filled by selection of wells not currently included in the RDBMS in order to meet CV-SALTS and SNMP objectives.

CDM Smith will use the computer program R to conduct the spatial statistical analyses. The script files will be included as a deliverable for subsequent use during implementation of the SAMP.

CDM Smith will also tabulate the temporal characteristics of the selected monitoring well network in order to perform statistical trend analyses. During selection of the monitoring well network, compiled RDBMS wells with more extensive and complete historical data records will be preferentially selected. The SAMP will be flexible and reflect changes to the monitoring program as necessary in an adaptive management paradigm.

#### **Task 7. Identify SAMP Stakeholders**

Under this task, CDM Smith will identify the SAMP stakeholders that will be responsible for implementing the SAMP. In this regard, the SAMP will rely on existing monitoring programs to the extent possible and will provide for less intense monitoring in areas of low or high vulnerability. Where it is deemed necessary to add sample stations or analytes, these costs, including compilation and reporting of the monitoring data, would be borne by the CV-SALTS stakeholders that are funding the SNMP. Cost apportionment will be determined through the CV-SALTS process. The outcome of this task will be included in the SAMP Technical Memorandum.

#### **Task 8. Develop Data Compilation and Reporting Protocols**

CDM Smith will develop data compilation and reporting protocols, including which entity, stakeholder, or group of stakeholder will ultimately be responsible for data compilation, monitoring, analysis, and reporting under the SAMP. Based on the requisite SAMP, there will be clear and precise data requirements that will be summarized as a section in the draft and final SAMP Technical Memoranda.

---

Key elements of this section will include: (a) a framework entity relationship diagram that is the architecture of the relational database management system; (b) a data dictionary that defines the data fields in the RDBMS; (c) an electronic data deliverable (EDD) request form for each of the identified SAMP data sources; the EDD request form will specify, at a minimum, the analytes, parameters, measurements; quality assurance data; reporting frequency; data quality specifications; and associated metadata and references; (d) a geodatabase to store and access shapefiles, such as IAZ boundaries, management zone boundaries, well locations, streams, land use, etc.; and (e) resolution of data compilation, storage, and reporting issues related to the monitoring data through discussions with the stakeholders. These issues include – but are not limited to – data security, data hosting, data privacy (what level of data access is to be provided to what parties), robust data backup, etc.

#### **Task 9. Prepare Draft and Final SAMP Technical Memoranda**

CDM Smith will prepare draft and final Technical Memoranda, including all requisite figures and tables. The Technical Memoranda will state the monitoring goals of the SAMP and include an implementation schedule. The schedule in Attachment 2 is based on comments being submitted in writing within 14 days of submission of the draft Technical Memorandum. If a longer comment period is required, then the schedule will shift accordingly.

Based on comments received on the draft Technical Memorandum, the final Technical Memorandum will be prepared within 14 days of receipt of the last comment. A detailed comment and response table will be completed and submitted as an appendix to the final SAMP Technical Memorandum. The Technical Memorandum will be written to be readily incorporated into the SNMP in order to facilitate adoption of the SNMP.

*Deliverables.* The deliverables for the SAMP will include the following:

- Monthly status reports (included with the invoice)
- Electronic and hard copies of PowerPoint presentations prepared for the TAC meetings
- Meeting agenda and notes
- SAMP monitoring well network – this is the primary deliverable from Task 6 and it will be incorporated into the Technical Memorandum
- Framework entity relationship diagram (ERD)
- Data dictionary
- Electronic data deliverable (EDD) request form
- Geodatabase
- Draft and final Technical Memoranda that include all of the work products from Tasks 1 through 8. An implementation schedule for monitoring and assessment will be included in the SAMP Technical Memoranda along with a statement of the monitoring goals for CV-SALTS.

**Surveillance and Monitoring Program**

**Attachment 2. Schedule**

Task	Description	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	
1	Project Set-up & Management	[Task 1 spans all months from Mar-15 to Oct-15]								
2	Identify Existing Monitoring Programs & Data Sources	[Task 2 spans Mar-15 to May-15]								
3	Identify Constituents of Concern	[Task 3 spans Mar-15]								
4	Incorporate Management Zones Delineations in the SAMP		[Task 4 spans Apr-15]							
5	Identify...Recharge Projects & Potable Supply Wells	[Task 5 spans Mar-15 to May-15]								
6	Define the Required SAMP & Identify Data Gaps/Overlaps			[Task 6 spans May-15 to Aug-15]						
7	Identify SAMP Stakeholders					[Task 7 spans Jul-15]	[Task 7 spans Aug-15]			
8	Develop Data Compilation & Reporting Protocols					[Task 8 spans Jul-15 to Sep-15]				
9	Prepare Draft & Final SAMP Technical Memoranda					[Task 9 spans Jul-15 to Oct-15]				

*Notice to proceed is anticipated to be March 16, 2015.*

**Surveillance and Monitoring Program**  
**Attachment 3. Project Budget**

Task	Description	Officer in Charge	Technical Review	PM/Env. Scientist	Senior Geologist	RDBMS /GIS	Clerical/ Contract Admin	Technical Review OP	Geochemist OP	Total Labor Hours	Total Labor Dollars	ODCs	Total Task Costs
1	Project Set-up & Management	2		4			8			14	\$2,219.42		\$2,219
2	Identify Existing Monitoring Programs & Data Sources		8	16	80	16			16	120	\$23,004		\$23,004
3	Identify Constituents of Concern			8	8				16	16	\$4,675.92		\$4,676
4	Incorporate Management Zones Delineations in the SAMP			8				4	8	8	\$3,101		\$3,101
5	Identify...Recharge Projects & Potable Supply Wells			8	18	24			8	50	\$9,246		\$9,246
6	Define the Required SAMP & Identify Data Gaps/Overlaps		8	48		40		4	80	96	\$26,831	\$1,400	\$28,231
7	Identify SAMP Stakeholders			16	8				8	24	\$5,837		\$5,837
8	Develop Data Compilation & Reporting Protocols			16		24			8	40	\$8,078		\$8,078
9	Prepare Draft & Final SAMP Technical Memoranda		8	32	16			4	32	56	\$15,466		\$15,466
<b>TOTAL</b>		<b>2</b>	<b>24</b>	<b>156</b>	<b>130</b>	<b>104</b>	<b>8</b>	<b>12</b>	<b>176</b>	<b>424</b>	<b>\$ 98,457</b>	<b>\$ 1,400</b>	<b>\$ 99,857</b>