

Innovative High-Efficiency Commercial Equipment Retrofit Program

2003 Urban Water Conservation Program Grant Application

submitted to

**California Department of Water Resources
Office of Water Use Efficiency
1416 Ninth Street, Room 338
Sacramento, CA 95814
Attention: Marsha Prillwitz (916) 651-9674**

December 5, 2002

by the

**Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118
tel: 408/265-2600
Contact: Hossein Ashktorab**



Cover Letter



Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

December 5, 2002

Marsha Prillwitz
California Department of Water Resources
Office of Water Use Efficiency
1416 Ninth Street, Room 338
Sacramento, California 95814

Dear Ms. Prillwitz:

It is our honor to submit an application to the California Department of Water Resources 2003 Urban Water Conservation Grant Program. The enclosed application includes a request for a grant to fund innovative high-efficiency commercial equipment retrofits, including x-ray film processor re-circulators, dental dry vacuum retrofits, and high-efficiency plumbing fixtures. Please contact us if you have questions or if we can provide additional information.

Thank you for your consideration.

Sincerely,

Hossein Ashktorab, Ph.D.
Manager, Water Use Efficiency Unit

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***Application Part A — Project Description,
Organizational, Financial and Legal Information***

A-1 Urban Water Conservation Grant Application Cover Sheet

1. Applicant (Organization or affiliation): Santa Clara Valley Water District
2. Project Title: Innovative High-Efficiency Commercial Equipment Retrofits

3. Person authorized to sign and submit proposal:

Name, Title Hossein Ashktorab,
Water Use Efficiency Unit Manager
Mailing address 5750 Almaden Expressway
San Jose, CA 95118-3614
Telephone (408) 265-2600
Fax (408) 267-3127
E-mail hashktorab@valleywater.org

4. Contact person (if different):

Name, Title (same)
Mailing address _____
Telephone _____
Fax _____
E-mail _____

5. Funds requested (dollar amount): \$496,000

6. Applicant funds pledged (local cost share) (dollar amount): \$162,600

7. Total project costs (dollar amount): \$658,600

8. Estimated net water savings (acre-feet/year): 158AF/yr

Estimated total amount of water to be saved (acre-feet): _____

Over 10 years 15,800AF

Benefit/cost ratio of project for applicant: 1.66

Estimated \$/acre-feet of water to be saved: \$417.94

9. Project life (month/year to month/year): 09/2003 to 09/2006

10. State Assembly Districts where the project is to be conducted: 20, 21, 22, 23,

24, 27 & 28

11. State Senate District where the project is to be conducted: 10, 11, 13, 15

12. Congressional District(s) where the project is to be conducted: 14, 15, 16, 17

13. County where the project is to be conducted: Santa Clara County

14. Do the actions in this application involve physical changes in land use, or potential future changes in land use?

(a) Yes _____

(b) No X

A-2 Application Signature Page

By signing below, the official declares the following:

The truthfulness of all representations in the application;

The individual signing the form is authorized to submit the application on behalf of the applicant;

The individual signing the form read and understood the conflict of interest and confidentiality section and waives any and all rights to privacy and confidentiality of the application on behalf of the applicant; and

The applicant will comply with all terms and conditions identified in this Application Package if selected for funding.

Signature

Name and title

Date

A-3 Application Checklist

Complete this checklist to confirm all sections of this application package have been completed.

Part A: Project Description, Organizational, Financial and Legal Information

- _____ A-1 Urban Water Conservation Grant Application Cover Sheet
- _____ A-2 Application Signature Page
- _____ A-3 Application Checklist
- _____ A-4 Description of project
- _____ A-5 Maps
- _____ A-6 Statement of work, schedule
- _____ A-7 Agency authority
- _____ A-8 Operation and maintenance (O&M)
- _____ A-9 Innovation

Part B: Engineering and Hydrologic Feasibility (construction projects only)

- _____ B-1 Certification statement
- _____ B-2 Project reports and previous studies
- _____ B-3 Preliminary project plans and specifications
- _____ B-4 Construction inspection plan

Part C: Plan for Environmental Documentation and Permitting

- _____ C-1 CEQA/NEPA
- _____ C-2 Permits, easements, licenses, acquisitions, and certifications
- _____ C-3 Local land use plans
- _____ C-4 State and local statutes and regulations

Part D: Need for Project and Community Involvement

- _____ D-1 Need for project
- _____ D-2 Community involvement, support, opposition

Part E: Water Use Efficiency Improvements and Other Benefits

- _____ E-1 Water use efficiency improvements
- _____ E-2 Other project benefits

Part F: Economic Justification, Benefits to Costs Analysis

- _____ F-1 Net water savings
- _____ F-2 Project budget and budget justification
- _____ F-3 Economic efficiency
- _____ Benefit/Cost Analysis Tables 1; 2; 3; 4a, 4b, 4c, 4d; and 5

A-4 Description of Project

Purpose, goals, and objectives

This project is targeted at installing innovative high-efficiency water-using commercial equipment:

- X-ray film processor re-circulating retrofits for the health care industry
- Dry vacuums for dental offices
- High-efficiency plumbing fixtures (dual-flush toilets, 4-liter ULFTs, or urinal retrofits)

Location

The Santa Clara Valley Water District (SCVWD) has enlisted the support of its retail agencies in installing some of the more recent innovations in commercial equipment. Many of these innovations have been tested at a reconnaissance level within the county and have shown early water savings that merit their installation on a broader level. We also propose installation of some of the plumbing fixtures in noncommercial sites in cases where there is a good prospect of generating useful feedback on their practicability.

Summary of methods and procedures

The project builds upon SCVWD's ongoing conservation and outreach programs, so that funds from this grant proposal will be dedicated entirely toward equipment capital costs. The new X-ray film processor retrofits and dental dry vacuums require more marketing savvy (a comprehensive marketing/outreach campaign) to address customer concerns about maintaining an equivalent level of equipment performance. The High Efficiency Toilets (HETs) are innovative in that they will result in about 20 percent more savings than conventional Ultra Low Flush toilets (ULFTs). ULFTs are designed for 6-liters/1.6 gallons per flush. Dual-flush toilets are designed for 1.6 gallons per flush for long and .8 gallons per flush for short flushes. Toilets in commercial settings tend to be characterized by much higher utilization levels; while this leverages water savings, commercial customers are also very concerned about service levels. This program will promote the new HET technologies while evaluating the practical success—in terms of customer acceptance as well as water savings—in a mix of commercial establishments.

The existence of volumetric wastewater charges in many parts of the service area will translate into very short payback periods for many large commercial customers. A well-marketed program will have good expectations for success, if it can address customer concerns for the effects of any service disruption due to performance issues. Integration into existing conservation programs may mitigate these concerns and reduce some installation costs. CII customers have been identified through previous customer outreach (and via other programs and customer analysis) that have large conservation potential.

Summary of expected outcomes, benefits, and costs

The expected results of this program extend beyond the immediate, albeit large, water savings. By scaling the early success stories and establishing customer acceptance, this program can lay the groundwork for broader application of these technological innovations. Results of customer experiences and reductions in water consumption will be monitored and evaluated for integration into the SCVWD's Integrated Water Resource Plan.

The total cost of the program, including in-kind contributions from agencies is approximately \$658,600. In-kind contribution is \$162,600. This proposal requests \$496,000 in grant funding.

The total water savings is expected to be 158 acre-feet per year, which translates into benefits (avoided costs) of \$148,804 per year.

A-5 Maps

Since this is not a construction project, a map is not required.

A-6 Statement of Work, Schedule

Tasks

Task 1. Review and identify project sites. For each of the technologies, there is a different set of potential sites for applications with some possible overlaps:

- Water-Efficient X-ray Film Processor Retrofits. Initial research suggests there are 19 Hospitals with X-Ray Processors (not including Stanford or Packard's Children Hospital) in Santa Clara County. A weighted average of 3 processors per hospital is based on a surveyed range of 1-9 processors per hospital. Thus, the estimated number of existing units in the service territory is 57. Selecting a retrofit goal of approximately 1/3 of existing units results in the proposed target of 20 units. All of these sites have been identified and they have been contacted with regard to their X-ray film processors at least for the earlier survey conducted by the SCVWD.
- Dental Office Dry Vacuums. According to the Santa Clara County Department of Health there are 122 dental facilities in the county. Each office must have at least one vacuum pump for a potential total of 122. Typically one pump will serve the vacuum needs of several stations at a dentist office. Since this technology has an emerging track record in terms of customer acceptance, we propose a retrofit goal of 10 percent.
- Dual-Flush and Four Liter (4-liter) Toilets. Among the large number of commercial sites in the service territory, we propose to target high volume sites and those sites with existing fixtures that are water-inefficient. Toilets that are already ULF will not qualify. The program will set aside a minimum number of installations for replacements meeting ADA requirements (that is, retrofits for those fixtures typically found in handicapped stalls). Targeting will be based on building age and previous ULFT replacement history. The replacement goal will be 1,200 ULFTs, including approximately 600 commercial installations, and 600 commercial installations for ADA facilities. We propose to reserve the flexibility to install all dual-flush if the volume pricing we get on the 4-liter toilets is not as expected. We also propose to reserve the flexibility to install no more than 100 of the toilets at multi-family residential sites (commercial rental properties) that show particular promise of water savings (e.g., high persons per household).
- Urinal Retrofits. Two types of target sites will be sought for urinal retrofits. The first type of site is one characterized by high total

volume of flush traffic, such as busy restaurants, parks, and shopping centers. The second type of site is one characterized by sporadic high volume and low volume—the so-called “stadium” flush traffic pattern. Automatic sensor flush valves perform poorly with stadium traffic patterns because they either flush more than necessary—immediate repeated flushes during half time—or too little—where crowding appears as continual signal to the sensor. The latter types of sites include stadiums, theaters, and train stations. In these second types of sites we propose urinal valves with “stadium” flush cycles that engage and disengage automatically. We propose a retrofit goal of 100 total urinal retrofits in the service area.

Task 2.

To contact sites for the toilets and urinal retrofits, we propose first a marketing approach consisting of direct mail, advertisements in local trade periodicals, and directed telemarketing. For the dual-flush and 4-liter toilets, contact sites and offer direct installation of the toilets at no cost to the customer. For urinal retrofits, offer a rebate or voucher of a fixed amount toward purchase and installation

For the X-ray film processors, contact sites and offer incentives for implementing innovative technologies. We propose to provide incentives in the form of a voucher for 50 percent of the cost of the unit with installation, plus a training and evaluation grant to assist in getting the units running and integrated into a systematic maintenance schedule and to install water meters to measure and verify water conservation savings. (We are open to considering alternatives if this aligns our goals with those of State and CALFED objectives. For example, an incentive program could be developed in conjunction with a water savings objective—say 100 percent of the upgrade would be covered if the potential water savings were achieved in practice.)

For the dental office vacuums, contact sites and offer incentives for implementing innovative technologies. To contact the hospitals and dental offices, we propose individualized marketing strategy consisting of direct mailing of letters, follow up calls, discussion, and invitation to participate. This would functionally combine a screening component with recruiting. We propose to provide incentives in the form of a fixed amount rebate or voucher to offset the cost of the unit with installation.

Task 3. Integrate toilet direct install program and X-ray film processor and dental office vacuum hardware incentives program into ongoing innovative equipment program development. The proposed program will build on the ongoing customer outreach efforts of the SCVWD. By building on existing programs, the grant funds’ will be effectively leveraged.

Task 4. Track installations and associated costs and savings. Review annually. Through a process of continual customer inquiry and feedback, the program implementation will be streamlined, improved, and evaluated over time.

Results from this analysis will be integrated in the IWRP and will form the basis for future investment decisions as to how these programs can best be scaled.

Task 5. Coordination and Administration. This task involves the coordination and administration of all program elements.

Deliverables

The expected products of the grant program include the following:

- Tracking reports, quarterly and annually.
- Annual evaluation memo to the Board, including all the assessment measures listed above.
- Program description and offering packages each for the target audiences: hospital administrators, dental offices, and a general commercial sites package for toilets and urinals.
- A brief executive summary of the project to help disseminate the results of this study to the broader conservation community.

Schedule

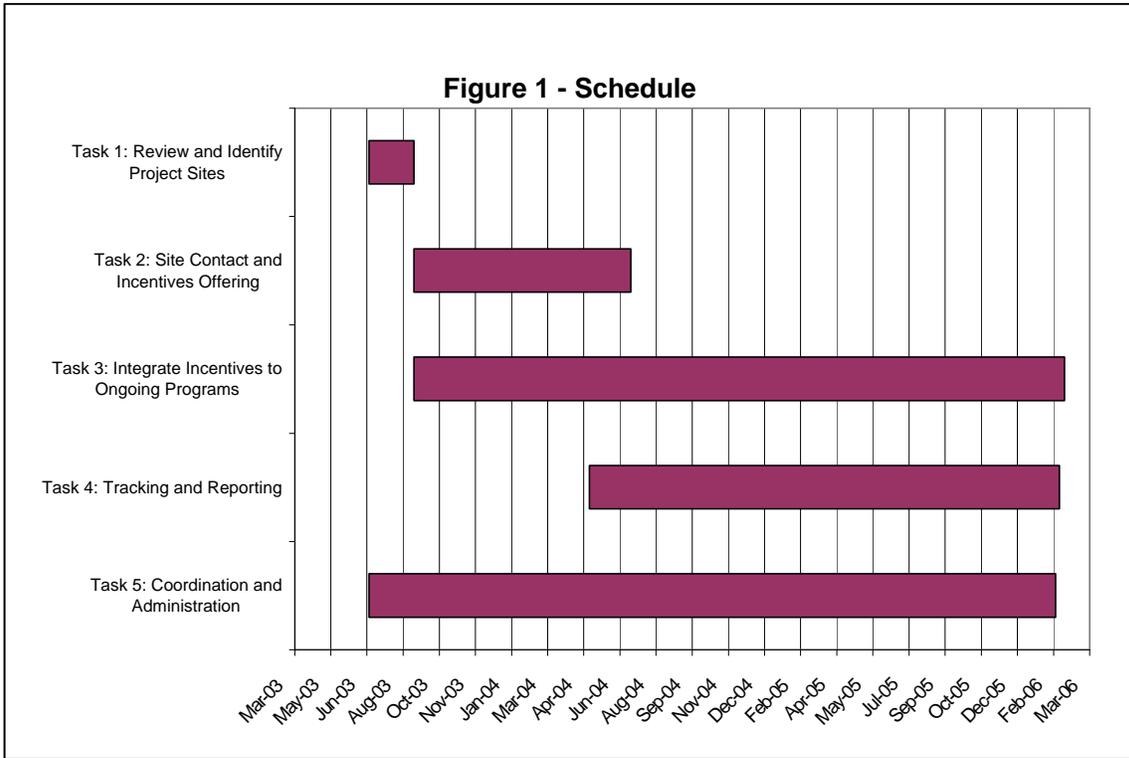
Funds are being requested over a three-year implementation period (Table A). The program implementation would be progressive over this period to allow program improvements and revisions (Figure 1).

Table A - Schedule

Task	Start Date	Duration (Days)	End Date
Task 1: Review and Identify Project Sites	1-Jul-2003	62	31-Aug-03
Task 2: Site Contact and Incentives Offering	1-Sep-2003	300	26-Jun-04
Task 3: Integrate Incentives to Ongoing Program	1-Sep-2003	900	16-Feb-06
Task 4: Tracking and Reporting	1-May-2004	650	9-Feb-06
Task 5: Coordination and Administration	1-Jul-2003	950	4-Feb-06

Separability of tasks

We propose that separation take place along one of two dimensions: Support only a subset of the equipment categories rather than all of them, OR scale the size of the program down rather than cutting out a single task.



Projected costs by task

Table B shows the project costs by task, with cost shares calculated.

Table B: Budget for SCVWD Commercial Equipment Program

SCVWD: Water									
	SCVWD: Water Use Efficiency Unit Manager		Conservation Specialist 1		SCVWD: Water Conservation Specialist 2		Total		
Rate:	\$53.94/hr.		\$32.61/hr.		\$35.99/hr.				
Task	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	
Task 1: Review and Identify Project Sites	70	\$ 3,776	140	\$ 4,565	140	\$ 5,039	350	\$ 13,380	
Task 2: Site Contact and Incentives Offering	24	\$ 1,295	48	\$ 1,565	48	\$ 1,728	120	\$ 4,587	
Task 3: Integrate Incentives to Ongoing Programs	16	\$ 863	32	\$ 1,044	32	\$ 1,152	80	\$ 3,058	
Task 4: Tracking and Reporting	50	\$ 2,697	100	\$ 3,261	100	\$ 3,599	250	\$ 9,557	
Task 5: Coordination and Administration	40	\$ 2,158	80	\$ 2,609	80	\$ 2,879	200	\$ 7,646	
Total	200	\$ 10,788	400	\$ 13,044	400	\$ 14,396	1,000	\$ 38,228	
Collaborating Agencies: Collaborating Agencies:									
	Water Use Efficiency Unit Manager		Water Conservation Specialist 1		Collaborating Agencies: Water Conservation Specialist 2		Total		
Task	Hours	\$53.94/hr.	Hours	\$32.61/hr.	Hours	\$35.99/hr.	Hours	\$/Task	
Task 1: Review and Identify Project Sites	24	\$ 1,295	48	\$ 1,565	48	\$ 1,728	120	\$ 4,587	
Task 2: Site Contact and Incentives Offering	24	\$ 1,295	48	\$ 1,565	48	\$ 1,728	120	\$ 4,587	
Task 3: Integrate Incentives to Ongoing Programs	16	\$ 863	32	\$ 1,044	32	\$ 1,152	80	\$ 3,058	
Task 4: Tracking and Reporting	16	\$ 863	32	\$ 1,044	32	\$ 1,152	80	\$ 3,058	
Task 5: Coordination and Administration	16	\$ 863	32	\$ 1,044	32	\$ 1,152	80	\$ 3,058	
Total	96	\$ 5,178	192	\$ 6,261	192	\$ 6,910	480	\$ 18,349	
Evaluation Contractor									
Task	Hours	\$100/hr.					Hours	\$/Task	
Task 1: Review and Identify Project Sites	-	\$ -					-	\$ -	
Task 2: Site Contact and Incentives Offering	80	\$ 8,000					80	\$ 8,000	
Task 3: Integrate Incentives to Ongoing Programs	80	\$ 8,000					80	\$ 8,000	
Task 4: Tracking and Reporting	160	\$ 16,000					160	\$ 16,000	
Task 5: Coordination and Administration	-	\$ -					-	\$ -	
Total	320	\$ 32,000					320	\$ 32,000	
Summary									
	SCVWD		Collaborating Agencies		Evaluation Contractor		Total		
Raw Labor	\$	38,228	\$	18,349	\$	32,000	\$ 88,577		
Overhead (@120.23%)*		45,962		22,062		included	\$ 68,023		
Local Travel and Transportation	\$	2,000	\$	2,000	\$	2,000	\$ 6,000		
Rebates/Vouchers for Customers Participating	\$	496,000					\$ 496,000		
Total Project Costs	\$	582,190	\$	42,411	\$	34,000	\$ 658,600		
Participant Agency Costs	\$	86,190	\$	42,411	\$	34,000	\$ 162,600		
Requested Grant Funding = Rebates/Vouchers for Customers	\$	496,000	\$	-	\$	-	\$ 496,000		

*FY 2000-01 SCVWD's Federal Office of Management & Budget (OMB) Circular A-87 Overhead Rate = 120.23% (Will apply current rate to Actual Claim.)

Quarterly expenditure projection

Table C shows the projected quarterly expenditures.

Quarter	Percent	Total	Grant
1	11.0%	\$ 72,446	\$ 54,560
2	10.0%	\$ 65,860	\$ 49,600
3	10.0%	\$ 65,860	\$ 49,600
4	10.0%	\$ 65,860	\$ 49,600
5	7.0%	\$ 46,102	\$ 34,720
6	7.0%	\$ 46,102	\$ 34,720
7	7.0%	\$ 46,102	\$ 34,720
8	7.0%	\$ 46,102	\$ 34,720
9	7.0%	\$ 46,102	\$ 34,720
10	7.0%	\$ 46,102	\$ 34,720
11	7.0%	\$ 46,102	\$ 34,720
12	10.0%	\$ 65,860	\$ 49,600
Total	100.0%	\$ 658,600	\$ 496,000

Summary: Technical Adequacy and Readiness to Proceed

The proposed program represents a set of unique opportunities in that the suggested technologies will be tested for main-stream use in commercial applications. This proposal does not pretend that the proposed innovative technologies are the end all of market acceptance. Rather, the objective is to gain market penetration and to hone agency implementation strategies. In addition, the proposed program would further understanding of customer acceptance, cost effectiveness, and water savings in practice. For example:

- The water efficient “Water Saver/Plus” produced by C&A X-Ray has the capability of reducing the amount of water required to operate a film processor by over 90%. This new device was described in the CUWCC’s Waterlogue of December 2001, as “a new development in the diagnostic medical equipment which holds promise for saving extraordinary amounts of water”. The equipment has been used in a series of independent studies carried out by seven large southern California hospitals. C&A X-Ray has patented the technology that recirculates water and blends with a minimal amount of freshwater to maintain proper temperature.
- Dry vacuum technologies have been developed to be quiet and easy to maintain according to manufactures. Dry vacuum units can replace liquid ring vacuum pump systems in most dental office settings. The City of Austin has a combined water and energy rebate program for dry vacuum pumps. Rebate amounts depend on the horsepower of the pump motor.

- Dual flush toilets have been used commonly in Australia and at the reconnaissance level in the U.S. The lessons from the introduction of 1.6 gpf toilets have been recorded and they suggest marketing and program development approaches to create a sound approach to introducing dual flush toilets and 4-liter toilets. At least three evaluations of dual flush toilets have been completed, including commercial office and restaurant settings, as well as single- and multi-family residences. Careful attention will be placed not only on customer acceptance, but also on other technical issues such as drain line carrying capacity (particularly for the 4 liter flush toilet).
- The technical features of new urinal valves include the timing and cycling of flushing, including the “stadium” mode.

A-7 Monitoring and Evaluation

The benefits expected from this project include:

- Water conservation benefits include reduced Bay Delta environmental stress and reduced water costs; and
- Reduced energy consumption.

A more detailed description of the benefits is included in Section E below.

Assessment procedures:

This program includes a focused evaluation component to assess costs and savings, in keeping with the SCVWD's Integrated Water Resources Plan (IWRP). In particular:

- Cost data will be maintained by SCVWD;
- Savings can be assessed with tracking data and results of savings studies performed in comparable settings; and
- A summary report and data will be available at the end of the evaluation.

Performance Measures

Performance will be evaluated with regard to the goals and objectives of the program. Measures of performance will include:

- The share of recommended equipment upgrade goals that have been implemented.
- The measured water savings as determined with billing system histories.
- Costs of the program as tracked by program administrators.
- Cost per acre-foot savings as calculated from the above data.
- Persistence of savings as tracked by the program over time.

Data will be tracked by maintained by staff and will be available in readily accessible formats (e.g. Excel or Access).

Products

The expected products of the grant program include the following:

- Tracking reports, produced quarterly and annually.
- An annual evaluation memo to the Board, including all the assessment measures listed above.
- Program description and offering packages each for the target audiences: hospital administrators, dental offices, and a general commercial sites package for toilets and urinals.
- A brief executive summary of the project to help disseminate the results of this study to the broader conservation community.

A-8 Qualifications of the Applicant and Cooperators

Resume of the project manager.

Attached to the end of the Application.

External Cooperators

The general roles of the external cooperators will consist of the following:

- Project direction and oversight
- Funding support
- Site location
- Assessment of project costs and benefits from different agency perspectives: groundwater, wastewater, reclamation, wholesale and retail water supply.
- Identify cost-effective opportunities for cooperation on additional programs where mutually beneficial.
- Assessment of implementation barriers and opportunities at different agency perspectives.

A-9 Innovation

The innovation involved with the grant is twofold, including:

- The technologies themselves are highly innovative, and
- Program implementation and delivery mechanism of the conservation programs for these new technologies.

A-10 Agency Authority

Address the following five questions pertaining specifically to this application.

1. Does the applicant (official signing A-2, Application Signature Page) have the legal authority to submit an application and to enter into a funding contract with the State? Provide documentation such as an agency board resolution or other evidence of authority.

Yes. The document below provides such authority.

POLICY OF THE BOARD	
	
Title: Delegation to the CEO	Category: Board—CEO Linkage
Policy No. <u>BL-4</u>	Date of Adoption: <u>June 15, 1999</u>

The Board will instruct the CEO through written policies which prescribe the organizational ends to be achieved, and describe organizational situations and actions to be avoided, allowing the CEO to use any reasonable interpretation of these policies.

Accordingly:

- 4.1. The Board will develop policies instructing the CEO to achieve certain results, for certain recipients at a specified cost. These policies will be developed systematically from the broadest, most general level to more defined levels, and will be called Ends policies.
- 4.2. The Board will develop policies which limit the latitude the CEO may exercise in choosing the organizational means. These policies will be developed systematically from the broadest, most general level to more defined levels, and they will be called Executive Limitations policies.
- 4.3. As long as the CEO uses any reasonable interpretation of the Board's Ends and Executive Limitations policies, the CEO is authorized to establish all further policies, make all decisions, take all actions, establish all practices and develop all activities.
- 4.4. The Board may change its Ends and Executive Limitations policies, thereby shifting the boundary between Board and CEO domains. By doing so, the Board changes the latitude of choice given to the CEO. But as long as any particular delegation is in place, the Board will respect and support the CEO's choices.

2. What is the legal authority under which the applicant was formed and is authorized to operate?

Santa Clara Valley Water District Act. The Santa Clara Valley Water District was created by an act of the California Legislature, and operates as a state of California Special District, with jurisdiction throughout Santa Clara County.

3. Is the applicant required to hold an election before entering into a funding contract with the State?

No.

4. Will the funding agreement between the applicant and the State be subject to review and/or approval by other government agencies? If yes, identify all such agencies (e.g. Local Area Formation Commission, local governments, U.S. Forest Service, California Coastal Commission, California Department of Health Services, etc.).

No.

5. Is there any pending litigation that may impact the financial condition of the applicant, the operation of the water facilities, or its ability to complete the proposed project? If none is pending, so state.

No.

A-11 Operations and Maintenance

(Required for construction projects only, including meter installations.)

Since this is not a construction project, this section is not applicable.

***Application Part B—Engineering and Hydrologic
Feasibility***

(Application Part B required for construction projects only, including meter installations.)

The proposed project does not involve construction. This section of the application is not applicable.

***Application Part C—Plan for Completion of
Environmental Documentation and Permitting
Requirements***

The application must include a plan for compliance with all applicable environmental requirements. The plan should address all the potential environmental, social and economic impacts of the proposed project, including mitigation, required under the California Environmental Quality Act (CEQA) and, if applicable, the National Environmental Policy Act (NEPA). The plan should also address compliance with local, county, State, and federal permitting requirements. If this project is not subject to CEQA or NEPA, so state in this section.

C-1 California Environmental Quality Act and National Environmental Policy Act

The proposed project in this application is not likely to be subject to CEQA/NEPA requirements. The most would be a negative declaration.

Necessary documentation will be completed prior to contract execution.

C-2 Permits, Easements, Licenses, Acquisitions, and Certifications

Not applicable.

C-3 Local Land Use Plans

Not applicable.

C-4 Applicable Legal Requirements

Necessary documentation will be completed prior to contract execution.

***Application Part D- Need for Project and
Community Involvement***

D-1 Need for the Project

Urgency

This project would serve to address environmental needs in the Bay Delta. The Bay-Delta ecosystem is stressed in terms of the balance between supply and demand, water quality in surface and groundwater, salt-water intrusion, and habitat management. It has become increasingly clear that careful planning is needed to avoid and mitigate problems surrounding potable water supply.

There have been major recent advances in the efficiency of water-using equipment in the commercial sector. The participating water agencies have practical experience in promoting technological innovation to commercial customers.

Water system condition

Though the SCVWD's water supply-demand balance is not currently in a critical condition, its recently completed Integrated Water Resources Plan (IWRP) takes a longer view. The IWRP identifies water conservation as an integral part of the county's long-term water resources portfolio.

The District supplies water to local water retail agencies, which in turn provide it to their customers in Santa Clara County. The water supply in this integrated system comes from a variety of sources. Nearly half is from local groundwater aquifers, and more than half is imported from the Sierra Nevada through pumping stations in the Sacramento-San Joaquin River Delta. The District has also invested in water conservation programs and water recycling. Both groundwater and imported water are sold to retailers. The District also manages the groundwater basin to the benefit of agricultural users and other independent groundwater pumpers.

For substitute supplies, the District has entered into a long-term water banking program with the Semitropic Water Storage District and may pursue other water banking alternatives in the future. The District's 2001 Urban Water Management Plan (UWMP) has not identified the need for any supplemental water supplies before the 2005 to 2010 time frame, in part due to investments in water conservation and water recycling.

The District has three geographically-dispersed water treatment plants (WTP): the Rinconada WTP, the Penitencia WTP, and the Santa Teresa WTP. Treated water pipelines that distribute water from the treatment plants to the water retailers include: the West Pipeline, the Campbell Distributary, the Santa Clara Distributary, the Mountain View Distributary, and the Sunnyvale Distributary from Rinconada WTP; the Snell Pipeline and Graystone Pipeline from Santa Teresa WTP; and the East Pipeline and Milpitas Pipeline from Penitencia WTP.

Consistency with other water management plans

The project is consistent with other state, regional, and local conservation planning activities:

Urban Water Management Plans. Water efficient technologies in commercial settings can contribute to achieving water savings, including peak-season savings.

MOU and BMPs. This program generally contributes to the MOU conservation objectives. The technologies are each examples developments that provide potential for developing Potential Best Management Practices or to fulfill existing BMPs.

Wastewater management plans would be supported by reduction in volume which reduces pumping costs.

SCVWD Integrated Water Resources Plan. This plan seeks to put conservation measures on equal footing with supply measures to meet the region's water needs. This can only be defensible if reliable and measurable savings can be determined.

Impact if not constructed

Since this is not a construction project, the impact of the project is not implemented are of different scale. The expected impacts would not be a single large shock, but rather incremental impacts associate with increasing need for water and decreasing ability to use water for ecosystem management.

As such, we would expect that not implementing the project would result in higher costs of water and reduced reliability solely to the extent of the project savings. Likewise, the project will contribute to CALFED objectives, as described in the benefits section. Thus, impacts on the Bay Delta Ecosystem would be of the scale commensurate with program savings.

D-2 Outreach, Community Involvement, Support, Opposition

Community based organizations and watershed groups

As part of the early planning of the project, we propose to identify community based organizations and watershed groups who may have an interest in this program. The following categories indicate the breadth of this outreach:

- Trade groups (hospitals, dentists, restaurants, apartment managers, etc.)
- Environmental interests regarding watershed, etc.

We envision early contact with customers and community groups to receive community and professional input.

Fit with local agency plans

Urban Water Management Plans. Water efficient technologies in commercial settings can contribute to achieving water savings, including peak-season savings.

MOU and BMPs. This program generally contributes to the MOU conservation objectives. It is an example of a technological development that provides great potential for existing and potential Best Management Practices.

Local groundwater basin management plans would be supported by efficient water use.

SCVWD Integrated Water Resources Plan. This plan seeks to put conservation measures on equal footing with supply measures to meet the region's water needs. This can only be defensible if reliable and measurable savings can be determined.

Local agencies

This projects as proposed in this grant application would be administered and conducted primarily by the Santa Clara Valley Water District. As a regional water wholesaler and groundwater agency, the SCVWD has strong reasons itself to investigate commercial water efficiency. However, since the water system is complex in the region, conservation technology has potential benefits across a number of agency jurisdictions—including wastewater agencies. SCVWD expects to approach a number of potential beneficiary agencies as the project moves forward and to seek collaboration and coordination.

The general roles of the external cooperators will consist of the following:

- Project direction and oversight
- Funding support
- Site location
- Assessment of project costs and benefits from different agency perspectives: groundwater, wastewater, reclamation, wholesale and retail water supply.
- Identify cost-effective opportunities for cooperation on additional programs where mutually beneficial.
- Assessment of implementation barriers and opportunities at different agency perspectives.

Some of the potential beneficiaries and collaborators for this project include the following:

a) San Jose / Santa Clara Water Pollution Control Plant

The San Jose/Santa Clara Water Pollution Control Plant is a large advanced wastewater treatment plant that treats wastewater from over 1,500,000 people that live and work in the 300-square mile area encompassing San Jose, Santa Clara, Milpitas, Campbell, Cupertino, Los Gatos, Saratoga, and Monte Sereno. The Water Pollution Control Plant has the capacity to treat 167,000,000 gallons of wastewater per day.

b) City of Sunnyvale Water Pollution Control Plant

The facilities and services provided by the City of Sunnyvale Water Pollution Control Plant include:

- Industrial Pretreatment
- Water Reclamation
- Water Conservation
- Water Connections
- Pollution Control Operations and Maintenance
- Public Education

c) The Palo Alto Regional Water Quality Control Plant

The Palo Alto Regional Water Quality Control Plant treats wastewater from the East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Mountain View, Palo Alto, and Stanford. The plant provides advanced treatment of wastewater, including primary, secondary, and tertiary treatment. The plant disinfects and filters two million gallons per day to meet California Code of Regulations, Title 22 standards for unrestricted reuse. Reuse expands the limited water supply in California and reduces plant discharge to the Bay. The water is used for irrigating golf courses, construction tanker trucks, and for a marsh that supports endangered species, migrant birds, and wildlife.

d) South County Regional Wastewater Authority

South County Regional Wastewater Authority is a jointly owned by the Cities of Gilroy and Morgan Hill.

e) City of Mountain View Public Services Department (Water)

In addition to the wastewater and reclamation interests, as water supplier the City has interests in reducing demand for treated water.

f) City of Sunnyvale Public Works Department (Water)

In addition to the wastewater and reclamation interests, as water supplier the City has an interest in moving customers from inefficient equipment as a demand management tool.

Opposition

We have not identified any potential interests that would be in opposition to this program.

***Application Part E—Water Use Efficiency
Improvements and Other Benefits***

E-1 Water Use Efficiency Improvements

The application states:

“For purposes of this application, water use efficiency means an action or an activity that causes the net value of the beneficial use of water to be increased. This increase can be due to a decrease in the costs associated with the use of that water (e.g., reduced acquisition and/or treatment costs), an increase in the value generated by the use of that water (e.g., increased urban, agricultural, or environmental water supply reliability) or both.”

We start with the water savings, and then address decreased costs and increased value below.

Use less water

Each of the water saving technologies has been studied to determine water savings:

- The water efficient “Water Saver/Plus” produced by C&A X-Ray has the capability of reducing the amount of water required to operate a film processor by over 90%. This new device was described in the CUWCC’s Waterlogue in of December 2001, as “a new development in the diagnostic medical equipment which holds promise for saving extraordinary amounts of water”. A series of independent studies carried out by seven large southern California hospitals demonstrated that the Water Saver/Plus was able to reduce the hospitals X-Ray process water requirements from over 123 acre-feet per year to less than 3.8 acre feet. The estimated savings per retrofit are 1 million gallons annually.
- By replacing the liquid ring vacuum pump system with a waterless dry vacuum system, water consumption associated with vacuum pump systems can be reduced to zero. Thus, savings are determined by assessing current consumption, which has been estimated in the range from (estimated savings per retrofit) 2,625 to 210,000 gallons per year.
- The savings from dual flush toilets derive from: (1) the number of regular flushes replaced by the “half” flushes (liquid only flushes that consume only .8 gallons) and (2) the replacement of old toilet fixtures that have 3.5 or 5.0 gpf with a 1.6 gpf unit. Dual can save approximately 20% more than traditional 1.6 models. The additional savings that dual flush toilets offer over traditional ULFTs implies that the resulting savings is 68 gpd rather than 57 gpd in high-use commercial establishments. Dual-flush toilet water consumption is approximately 1.2 gpf when the mix of full and half flushes are put

into the equation, as has been found through previous studies. 4-liter toilets flush 1gpf consistently, so the potential savings are even greater.

- Savings from urinal retrofits result from reduced flow cycles per flush and improved programming for electronically controlled valves.

Decrease in cost of using water:

The following are benefits of the proposed conservation devices:

- Reduced water acquisition, treatment, and distribution costs of potable water;
- Reduced sewer collection system pumping costs because of lower volume;

Increased in value generated by the use of the water:

One use of the conserved water that can add substantial value is supply reliability. To the extent that conserved water translates to either higher reservoir levels or lower rates of groundwater overdraft, conserved water enhances reliability.

Additionally, during drought years in particular, the conservation of year-round demand reduces the cost of supply, treatment, and distribution during peak periods. We are referring to daily, seasonal, annual, and/or multi-annual peaks. Conservation of indoor water use is beneficial in that to the extent it is viewed as a supply source, it is more constant throughout the year and thus is a welcome component to the water supply portfolio.

E-2 Other Project Benefits

This project will have several important positive impacts on the Bay-Delta ecosystem:

- Conserving water in hospitals, dental offices, and in other commercial settings will reduce demand for water imported from the Bay-Delta to urban water agencies.
- Efficient water consuming equipment also is more energy efficient in terms of pumping and treatment, saving the Bay-Delta ecosystem an increment of environmental damage resulting from energy production and distribution.

This project is consistent with the CALFED objectives in that it:

- Reduces demand allowing for improvements in habitat and ecosystem functions; and
- Generally reduces the mismatch between Bay-Delta water supply and demand.

***Application Part F – Economic Justification:
Benefits to Costs***

F-1 Net Water Savings

The application defines net savings as follows:

“Net water savings means savings achieved by reducing water losses that are currently going to an “unusable” destination from an already-developed primary water source or sources. Net water savings can be achieved by:

- reducing losses to the atmosphere through evaporation or transpiration
- reducing losses to saline or other unusable aquifers or water bodies through percolation or surface flows.”

In what follows, we consider first savings calculations, and then discuss the two criteria of loss to atmosphere and to unusable water bodies.

Water savings

We expect considerable savings in water consumed by the sites who participate in this program.

- A series of independent studies carried out by seven large southern California hospitals demonstrated that the Water Saver/Plus was able to reduce the hospitals X-Ray process water requirements from over 123 acre-feet per year to less than 3.8 acre feet. The estimated savings per retrofit are 1 million gallons annually.
- Savings from dry vacuum dental office equipment have been estimated in the range from (estimated savings per retrofit) 2,625 to 210,000 gallons per year. The attached budget assumes 100,000 gallons per year savings per unit.
- The savings from dual flush toilets and 4-liter toilets is expected to be 20 percent greater than conventional ULFTs, and to vary considerably depending on commercial application.
- Savings from urinal retrofits depends on use intensity largely, as high efficiency equipment results in .5 gpf rather than a more conventional 1.0 gpf.

Reduce loss to atmosphere through evaporation or transpiration

We do not expect loss reduction from evaporation or transpiration. The proposed projects conserve water that would otherwise go down the drain.

Reducing losses to saline or other unusable aquifers or water bodies through percolation or surface flows

The proposed project will reduce losses in that they will reduce flows to sanitary sewer systems that are ultimately discharged into the Bay after treatment.

We do not envision the reduction or elimination of water losses recovered or potentially recoverable outside the local agency's service area.

F-2 Project Budget and Budget Justification

The budgeted costs include planning, purchase and installation of project-related materials, and administration.

None of the following items are in the budget:

1. Costs, other than those noted above, incurred prior to applying for or receiving funding,
2. Operation and maintenance costs,
3. Purchase of equipment not an integral part of the project,
4. Establishing a reserve fund,
5. Purchase of water supplies,
6. Replacement of existing funding for ongoing programs,
7. Support of existing agency requirements and mandates,
8. Purchase of land in excess of the minimum required acreage necessary to operate as an integral part of the project, as set forth and detailed by engineering and feasibility studies, and
9. Payment of principal or interest of existing indebtedness or any interest payments unless:
 - a) The debt is incurred after issuance of a letter of commitment of funds by DWR;
 - b) The DWR agrees in writing to the eligibility of the costs for reimbursement before the debt is incurred; and
 - c) The purposes for which the debt is incurred are otherwise eligible project costs.

Project Budget

The detailed budget presented in Table B in Section A shows that following items are included:

- **Planning/Design/Engineering.** The justification of this cost item is that it will take time to review and identify the sites to approach with the programs. Also, included in this item is evaluation support to provide the project with an independent evaluation of the cost and savings of the program over time.
- **Materials/Installation.** The justification for the materials and installation items is that this is the core of the program offered. The point of the proposed program is that although conservation technologies have been developed, there exist barriers to implementing the equipment upgrades due to funding issues. Table D includes activity levels, costs for materials and installation as relevant by technology, and savings.
- **Administration.** Administration will guide and review each element of the program to assure focus, direction, accountability, and compliance with administrative requirement of the agencies and of the Proposition 13 Grant.

Table D - Activity and Savings

Variable	X-Ray	Dentist Dry Vac	Dual-Flush: Commercial	4L Toilets: Commercial	Urinal Retrofits	Total
Number Incentives & Installations	20	12	600	600	100	
Average Cost per Item	\$ 3,000	\$ 2,000	\$ 335	\$ 335	\$ 100	
Savings per Item (gpd)	2,740	274	68.0	68.0	10.0	
Total annual savings AFY	61	4	46	46	1	158
Total Cost	\$ 60,000	\$ 24,000	\$ 201,000	\$ 201,000	\$ 10,000	\$ 496,000

Tables 1 and 2 in Appendix A have entered in them the program costs in the required format according to the application.

F-3 Economic Efficiency

The direct economic benefits accruing to project benefits include:

- Avoided cost of source water supply
- Avoided treatment cost
- Avoided distribution cost

The SCVWD estimates that its avoided supply projects include groundwater desalination, Bay water desalination, and the South Bay Water Recycling project. Table 4 includes the capital costs, O&M costs, and water supplied for each of these alternatives. The least cost alternative supply is groundwater desalination, which costs \$941/AF.

Analysis assumptions

We have used the following assumptions in determining the benefits and costs for the proposed project:

- **Period of analysis.** We have used a period of analysis of 10 years, which accounts for 10 years of effective savings.
- **Inflation and escalation.** We have assumed zero escalation and inflation.
- **Discount rate.** We have used the recommended discount rate of six percent.
- **Dollar value base year.** All benefits and costs are expressed in current year dollars--Year 2002 dollars.
- **Multiple-funded projects.** The economic analysis has been conducted

for the entire project, regardless of funding sources.

Project costs. For Tables 1, 2, and 3, all costs required to achieve project benefits have been included.

Avoided Cost of Current Supply Source (Table 4a). Since there are specific water supply projects that are avoidable, we use Table 4b.

Alternative Cost of Future Supply Sources (Table 4b). As mentioned above, the avoided supply costs assumes that new supply projects can be downsized proportionally. This proposal reports only the portion of the cost of water that would be avoided as a result of the proposed project.

Water Supply Vendibility (Table 4c). This project does not anticipate changes in revenue from water sales to existing customers, new customers, or other agencies.

Appendix A - Benefit/Cost Analysis Tables

Table 1: Capital Costs

Table 2: Annual Operations and Maintenance Costs

Table 3: Total Annual Costs

Table 4a: Water Supply Benefits: Avoided Cost of Current Supply Sources

Table 4b: Water Supply Benefits: Alternative Cost of Future Supply Sources

Table 4c: Water Supply Benefits: Supplier Revenue (Vendibility)

Table 4d: Total Water Supply Benefits

Table 5: Benefit/Cost Ratio

Table 6: Capital Recovery Factor

Appendix B - Resume

HOSSEIN ASHKTORAB
Santa Clara Valley Water District

EDUCATION:

Ph.D., University of California, Davis, 1989. Plant, Soil and Water Science.
Master of Science, California State University, Chico, 1981. Irrigation
Bachelor of Science, University of Mazandaran, 1979. Agriculture Engineering.

PROFESIONAL EXPERIENCE:

Unit Manager, Water Use Efficiency Unit, Santa Clara Valley Water District Jan. 2001 – Present

Responsible for managing the District Water Use Efficiency Unit (WUE) providing technical direction, coordinating its activities with other District Units, and external stakeholders including 13 water retailers. The water conservation program is a long-term commitment of the District, which provides the highest quality programs and educational opportunities to residents and businesses in Santa Clara County.

Managing the implementation of all 14 BMPs required by the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). In addition, managing the adopted Water Conservation Plan (including agriculture water conservation program) to comply with US Bureau of Reclamation mandate as required by the Central Valley Project Improvement Act (CVPIA).

Manage and participate in the development, implementation and administration of the water conservation and water recycling programs with more than \$9 million annual budget in Santa Clara County.

Develop partnership with local and regional cities including various water conservation programs with City of San Jose with more than \$3 million cost-sharing budget as well as cost-sharing agreement with six other agencies in Northern California for residential efficient clothes washing machine.

Participate and engage in the recycled water partnership such as South Bay Water Recycling cost sharing agreement for the amount of \$50 million projects in the Santa Clara County.

Participate and coordinate with local, regional and statewide water conservation and recycling organizations. Member of CUWA water conservation committee and CUWCC steering, plenary, Program committees and several subcommittees.

Water Conservation Specialist, Water Conservation & Recycling Unit, Santa Clara Valley Water District Jan. 1997- Jan. 2001

Developed and managed water conservation programs including programs for agricultural and large landscape water users.

Technical staff to District Landscape Water Advisory Committee, and District Agriculture Water Advisory Committee.

Responsible for implementation of CALFED grants for the District Agricultural and Urban Water Use efficiency programs. Developed proposals and received grant fund for two District's water recycling projects from Proposition-13 grant funding.

In partnership with the Santa Clara Farm Bureau, UC Cooperation Extension, Department of Agriculture, Department of Water Resources, and Santa Clara County Natural Resource Conservation Service, Developed and conducted nine Agricultural Irrigation and Nutrient Management seminars for the County growers and interested groups

Associate Land Water Use Analyst, California Department of Water Resources, December 1986 to September 1993.

Technical coordinator for the Assembly Bill 325 Task Force Advisory Committee in 1991 and 1992 and facilitated the development of the State Landscape Water Conservation Model Ordinance. Assisted water agencies, cities and counties to develop and implement landscape water conservation guidelines and ordinances.

As a member of the State Water Conservation Advisory Committee, participated in the development of the Best Management Practices (BMPs) in water conservation.

Participated in the negotiation with the agricultural stakeholders and U.S. Bureau of Reclamation for the State Department of Water Resources Drought Water Bank. Developed a new method using nonlinear regression model to estimate crop water requirement values for major crops in the Delta's agricultural area which was the bases for the negotiation of the irrigation water use.

Member of the 1989 and 1992 Xeriscape Conferences Steering Committee and chaired the Award Subcommittee meetings.

RESEARCH AND TEACHING EXPERIENCE:

Assistant Professor, Dept. of Irrigation Eng., Shiraz University. Sept.93-June 96.

Lectured on urban water use and conservation
Lectured on crop water requirements and evapotranspiration.
Lectured on irrigation systems and design.
Directed related laboratories and field trips.

Research Assistant professor, University of California, Davis. June 92 - Dec 1997.

Crop water requirement and water management
3-D Aerodynamic latent heat flux research studies
Field research study on irrigation system and evaluation.

CERTIFICATION:

Irrigation Systems Evaluation
Landscape Irrigation Master Auditor

PROFESSIONAL MEMBERSHIP:

American Society of Civil Engineers
Irrigation Association
American Water Works Association
WaterReuse Association

Appendix C – Letters of Support

Applicant: Santa Clara Valley Water District

THE TABLES ARE FORMATTED WITH FORMULAS: FILL IN THE SHADED AREAS ONLY

Table 1: Capital Costs

	Capital Cost Category	Cost	Contingency Percent	Contingency \$	Subtotal
	(a)	(b)	(c)	(d) (bxc)	(e) (b+d)
(a)	Land Purchase/Easement	0	0.00%	0	0
(b)	Planning/Design/Engineering	49,967	0.00%	0	49,967
(c)	Materials/Installation	591,929	0.00%	0	591,929
(d)	Structures	0	0.00%	0	0
(e)	Equipment Purchases/Rentals	0	0.00%	0	0
(f)	Environmental Mitigation/Enhancement	0	0.00%	0	0
(g)	Construction/Administration/Overhead	16,704	0.00%	0	16,704
(h)	Project Legal/License Fees	0	0.00%	0	0
(i)	Other	0	0.00%	0	0
<hr/>					
(j)	Total (1) (a + ... + i)				658,600
(k)	Capital Recovery Factor: Use Table 6				0.1359
(l)	Annual Capital Costs (j x k)				89,504

(1) Costs must match Project Budget prepared in Section F-2.

Applicant: Santa Clara Valley Water District

Table 2: Annual Operations and Maintenance Costs

Administration (a)	Operations (b)	Maintenance (c)	Other (d)	Total (e)
0	0	0	0	0

Table 3: Total Annual Costs

Annual Capital Costs (1) (a)	Annual O&M Costs (2) (b)	Total Annual Costs (c) (a+b)
89,504	0	89,504

(1) From Table 1, line (l)

(2) From Table 2, column (e)

Applicant: Santa Clara Valley Water District

Table 4: Water Supply Benefits
(2002 Dollars)

Net water savings (acre-feet/year) 158 <== Cell (E6)

4a. Avoided Costs of Current Supply Sources

Sources of Supply	Cost of Water (\$/AF)	Annual Displaced Water Supply (AF)	Annual Avoided Costs (\$)
(a)	(b)	(c)	(d)
			(b x c)
			0
			0
			0
			0
			0
Total			0

4b. Alternative Costs of Future Supply Sources

Future Supply Sources	Total Capital Costs (\$)	Capital Recovery Factor (1)	Annual Capital Costs (\$)	Annual O&M Costs (\$)	Total Annual Costs (\$)	Supply AF (g)	Unit Cost \$/AF (h) = (g/h)	Annual Avoided Costs (\$)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
			(d)		(d+e)			=(E6*i)
GW Desalination	46,000,000	0.0665	3,059,000	1,650,000	4,709,000	5,000	\$942	\$148,804
Bay Desalination	71,530,000	0.0665	4,756,745	3,750,000	8,506,745	5,000	\$1,701	
S. Bay Recycling	649,530,421	0.0782	50,793,279	8,626,400	59,419,679	26,300	\$2,259	
			0		0			
			0		0			
Total					72,635,424			148,804

(1) Use number from Capital Recovery Factor Table 6

4c. Water Supplier Revenue (Vendability)

Parties Purchasing Project Supplies	Amount of Water to be Sold (AF)	Selling Price (\$/AF)	Expected Frequency of Sales (1) (%)	Expected Selling Price (\$/AF)	"Option" Fee (2) (\$/AF)	Total Selling Price (\$/AF)	Annual Expected Water Sale Revenue (\$)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
				(cxd)		(e+f)	(b x g)
				0		0	0
				0		0	0
				0		0	0
				0		0	0
				0		0	0
Total							0

(1) During the analysis period, what percentage of years are water sales expected to occur?

For example, if water will only be sold half of the years, enter 50% (0.5).

(2) "Option" fees are paid by a contracting agency to a selling agency to maintain the right of the contracting agency to buy water whenever needed. Although the water may not be purchased every year, the fee is usually paid every year.

Table 4d. Total Water Supply Benefits

(a) Annual Avoided Costs of Current Supply Sources from 4a, column (d)			0
(b) Annual Avoided Costs of Alternative Future Supply Sources from 4b, column (f)			148,804
(c) Annual Expected Water Sale Revenue from 4c, column (h)			0
(d) Total Net Annual Water Supply Benefit (\$) (a+b+c)			
			148,804

Applicant: Santa Clara Valley Water District

Table 5: Benefit/Cost Ratio

Project Benefits (\$)(1)	148,804
Project Costs (\$)(2)	89,504
Benefit/Cost Ratio	1.66

(1) From Table 4d, row (d): Total Annual Water Supply Benefits
(2) From Table 3. column (c): Total Annual Costs

Table 6: Capital Recovery Table (6%)

Life of Project (in years)	Capital Recovery Factor
7	0.1791
8	0.1610
9	0.1470
10	0.1359
11	0.1268
12	0.1193
13	0.1130
14	0.1076
15	0.1030
16	0.0990
17	0.0954
18	0.0924
19	0.0896
20	0.0872
21	0.0850
22	0.0830
23	0.0813
24	0.0797
25	0.0782
26	0.0769
27	0.0757
28	0.0746
29	0.0736
30	0.0726
31	0.0718
32	0.0710
33	0.0703
34	0.0696
35	0.0690
36	0.0684
37	0.0679
38	0.0674
39	0.0669
40	0.0665
41	0.0661
42	0.0657
43	0.0653
44	0.0650
45	0.0647
46	0.0644
47	0.0641
48	0.0639
49	0.0637
50	0.0634