
**OBSTACLES
TO WATER RECYCLING
IN SILICON VALLEY**
A White Paper



www.svp2center.org

351 Brookwood Drive, San Jose, CA 95116-2742

Voice: 408 291-0131 Fax: 408 294-1239

July 18, 2003

prepared by

Bahman Sheikh, Ph. D., P. E.

Water Recycling Specialist

www.bahmansheikh.com

The Silicon Valley Pollution Prevention Center, a San Jose-based Public Benefit Corporation is governed by a twelve-member, tri-lateral Board of Directors, which includes executives from government, business and Environmental NGO's, who collaborate and advocate innovative pollution prevention programs in our local watersheds.

Our VISION

Our region will have cleaner water every year, and every year an increasing number of people and organizations will be involved in preventing pollution.

Our MISSION

Through a collaborative process involving our governmental, business-industrial, and environmental NGO directors, identify and advocate innovations in pollution prevention to improve our watersheds and waterways.

Board of Directors

Robin Brack
Hitachi Global Storage Technologies

Gail Brownell
Agilent Technologies

Margaret Bruce
*Silicon Valley
Manufacturing Group*

Tim Chow
*County of Santa Clara
Environmental Resources Agency Director*

Andrew Gere
San Jose Water Company

Michael Stanley Jones
*Silicon Valley
Toxics Coalition*

Rosemary Kamei
*Santa Clara Valley
Water District Board*

Trish Mulvey
CLEAN South Bay

Linda J. LeZotte
City of San Jose Council

Robin Saunders
*City of Santa Clara
Water & Sewer Director*

William Whitmer
President

TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
MOTIVATION	7
PROCESS	7
RESULTS	8
OBSTACLES TO WATER REUSE IN STATEWIDE CONTEXT	8
RECYCLED WATER TASK FORCE: WATER RECYCLING 2030	9
STAKEHOLDER INTERVIEWS AND INDUSTRIAL CUSTOMER SURVEY	10
<i>Industrial Customers</i>	11
<i>Agricultural Customers</i>	12
<i>Landscape Irrigation Customers</i>	13
<i>Environmental Advocates</i>	13
<i>Producers of Recycled Water</i>	14
<i>Water Purveyors</i>	15
CONCLUSIONS	16
RECOMMENDATIONS.....	19
ACKNOWLEDGMENTS	20
APPENDIX A.....	21
APPENDIX B	23

OBSTACLES TO WATER RECYCLING IN SILICON VALLEY

A White Paper

Executive Summary

The Silicon Valley Pollution Prevention Center recognizes that water recycling in general, and industrial water recycling in particular, leads directly to pollution prevention while at the same time reclaiming a valuable resource—water—in a water-deficient region. Therefore, SVP2C is highly motivated to elevate the fledgling water recycling programs in Silicon Valley into robust and fully committed routine practices. The present study was commissioned to engage the industry and the stakeholders in a dialogue that would reveal the nature and extent of obstacles that prevent rapid local water recycling and to recommend steps that remove these obstacles.

Over thirty interviews and survey responses were completed in March-May 2003, and the results are summarized in the present report. Nearly all persons contacted agreed that recycled water is an important component of a reliable water supply vital to the economic health of the Silicon Valley. Agreement was nearly universal that recycled water is appropriate for landscape irrigation. Most agreed that Industrial use of recycled water, including internal recycling of water, was also appropriate. Agricultural use and indirect potable reuse received mixed reviews primarily because of concerns over potential impacts on groundwater quality.

Obstacles identified in the course of these interviews are:

- Adverse public perception
- Concern about impact of irrigation on groundwater quality
- Institutional fragmentation of responsibilities
- Inappropriate regulations such as the plumbing code
- High cost of new treatment and distribution systems, relative to existing water supplies and a lack of an appropriate framework for evaluating recycled water project economics.
- Lack of an empowered champion to develop and market recycled water

Recommendations for removing or alleviating the identified obstacles are:

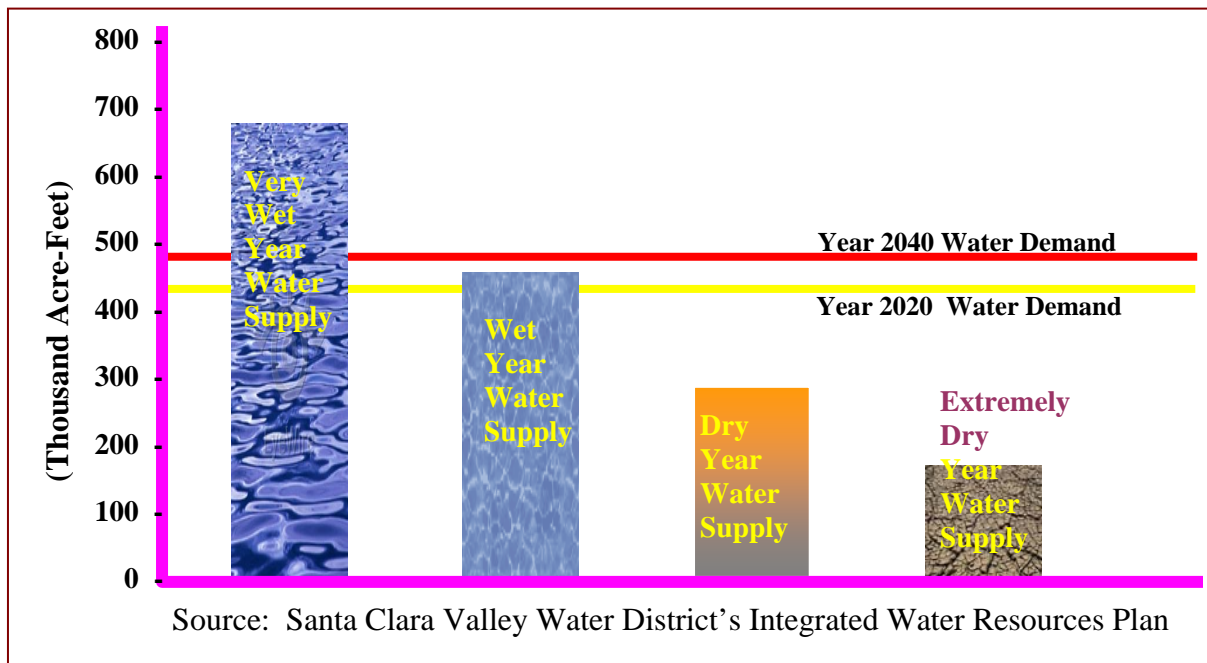
1. Design, implement and fund an effective public involvement and information program,
2. Draft and adopt model local ordinances requiring use of recycled water in specific cases.
3. Engage the environmental community in dialogue on the environmental benefits of recycled water
4. Commission an economic valuation study of recycled water's relative value as a sustainable water supply.
5. Ensure that local water and wastewater agencies empower appropriate individuals to serve as "champions" of recycled water for Silicon Valley.
6. Reduce the cost of recycled water to the customer by exempting it from service duplication requirements
7. Encourage SCVWD—or a new Joint-Powers Authority—to take over responsibility for recycled water marketing, distribution, and use on a regional or county-wide level.
8. Investigate any potential impact of irrigation with recycled water on groundwater quality due to leachates moving through the root zone toward the water table.
9. Evaluate the potential benefits of groundwater recharge with recycled water and ways to eliminate the risk of subsequent degradation of aquifer water quality,
10. Seek additional ordinances and laws to phase out self-regenerating softeners

OBSTACLES TO WATER RECYCLING IN SILICON VALLEY

Preface

A “White Paper”, according to Merriam-Webster, is “a detailed or authoritative report”¹. This report presents a detailed recounting of the reactions of professionals—those most directly involved in, affected by, and interested in water recycling in Silicon Valley—to several specific questions posed to them. To the extent that the report is able to convey their true responses, it may be considered to be authoritative, qualifying it as a white paper. To ensure that the report does indeed reflect the reactions of the stakeholders, the draft of the white paper was circulated among the respondents. They were given the opportunity to comment, re-prioritize conclusions and recommendations, and otherwise to make any corrections they felt necessary.

Fundamentally, water recycling is considered a necessity in a water-short area. In fact, the integrated water resources plan (IWRP) recently updated by Santa Clara Valley Water District declares that recycled water is an important component of the water supply mix in its service area. The IWRP projects water supply shortfalls in dry years in the future, as depicted in the graphic below:



¹ Webster’s Ninth New Collegiate Dictionary, Merriam-Webster Inc., Publishes, Springfield, Virginia, 1988.

OBSTACLES TO WATER RECYCLING IN SILICON VALLEY

A White Paper

Motivation

A pollution prevention technique is most effective when waste is eliminated at the source of its generation. When that waste is converted to a resource, the industry benefits from recycling the resource. When that resource is as vital as water, then pollution prevention — as water reuse — takes on dimensions for society as a whole, far beyond the market value of water.

Thus, the motivation of SVP2C in commissioning this study is to maximize the potential for pollution prevention through water reuse. This would be accomplished by providing a clear understanding of the nature and extent of obstacles to water recycling and reuse in Silicon Valley². Based on that understanding, the study would recommend ways to overcome the most pervasive and effective obstacles. In this pursuit, both internal water recycling and use of reclaimed water from municipal wastewater by various potential customers of recycled water are considered.

Process

In March 2003, the Board of Directors of SVP2C agreed to commission the preparation of this White Paper to identify the obstacles to water reuse in Silicon Valley. The paper is based on historical data, the results of the efforts of the California Water Recycling Task Force, interviews with, and surveys of water recycling stakeholders in Silicon Valley. The White Paper lists obstacles to water recycling in Silicon Valley, ranks them, and recommends solutions to each obstacle thus identified.

² For the purposes of this paper, Silicon Valley is geographically defined approximately congruent with Santa Clara County.

Results

Results of the study are presented in two parts:

- Obstacles and Incentives to water reuse in a Statewide context, including Recommendations of the report of the 2003 Water Recycling Task Force, and
- Obstacles and Incentives in our local context based on stakeholder interviews and industrial survey.

Obstacles and Incentives to Water Reuse in Statewide Context

Over the last 40 years, several attempts have been made to identify and analyze the persistent obstacles to water reuse. Many of the obstacles have been removed, resulting in reuse of over 500,000 acre-ft per year, statewide. The potential, however, is much greater. Some of the obstacles persist in the face of ever mounting scientific evidence and experience record about the safety, economy, and efficacy of water recycling. Questions about safety, economy, and customer acceptance continue to be raised almost universally, whenever new water recycling projects are proposed.

In September of 1991, a statewide survey³ revealed the top obstacles to water recycling to be:

- Political Will—commitment at all governmental levels,
- Benefit Cost Analysis—accounting for all regional, environmental, and societal benefits,
- Funding Issues—lifting the burden of high up-front capital costs, usually borne entirely by one local agency,
- Regulatory Issues—overcoming overly restrictive requirements and even more restrictive interpretations by some local entities,
- Institutional Issues—purveyorship, anti-paralleling⁴, separation of water and wastewater responsibilities, and
- Other Issues—public acceptance, legal responsibilities, source control of salts.

Over 70 recommendations and implementation strategies were put forward to overcome these obstacles. Some of the recommendations were implemented over the decade, with moderate success—as evidenced by the rapidly growing annual volume of recycled water use throughout the state. This success, however, must be viewed in balance with a few dramatic failures of other water reuse projects, including:

- City of San Diego's Water Repurification Project,
- City of Los Angeles' East Valley Groundwater Recharge Project, and

³ "Water Recycling 2000: California's Plan for the Future", by the State Water Conservation Coalition/Reuse Task Force, and the Bay Delta Reclamation Sub-Work Group, September 1991.

⁴ "Anti-paralleling" refers to a California law (also known as the Water Service Duplication Act) that provides for a protected monopoly for water purveyors against all competition—including a potential distributor of recycled water other than the local water purveyor.

-
- Dublin San Ramon Sanitary District's Clean Water Revival Project.

These projects failed, in part due to the spread of fears by vocal opponents concerning risks to the public, and the use of those fears by politicians.

Recycled Water Task Force: Water Recycling 2030

Assembly Bill 331 was signed into law on October 7, 2001, creating the 2002 Recycled Water Task Force. The Task Force was charged with identifying constraints, impediments, and opportunities for the increased use of recycled water in California and to report to the Legislature by July 1, 2003. Membership in the Task Force was dictated by the legislature and drew from a wide spectrum of society. After a year-long process of meetings and six committees (work groups) activities, 26 issues/obstacles were identified and prioritized as follows:

1. Funding for Water Recycling Projects,
2. Community value-based decision-making model for project planning,
3. Leadership support for water recycling,
4. Educational curriculum,
5. State-sponsored media campaign,
6. Uniform plumbing code Appendix J,
7. DHS guidance on cross-connection control,
8. Health and safety regulation,
9. Restrictions on incidental runoff,
10. Uniform interpretation of state standards,
11. Water softeners,
12. Uniform analytical method for economic analysis,
13. Research funding,
14. University academic program for water recycling,
15. Funding coordination,
16. Regional planning criterion,
17. Funding information outreach,
18. Department of Water Resources technical assistance,
19. Project performance analysis,
20. Recycled water symbol code change,
21. Stakeholder review of proposed cross-connection control regulations,
22. Cross-connection risk assessment,
23. Permitting procedures,
24. Source control,
25. Economic analyses, and
26. Statewide science-based panel on indirect potable reuse.

The Task Force recently completed its final report⁵, detailing the identified issues and recommendations for action to move recycled water projects forward.

Clearly, many—if not all—of these statewide issues are also issues in Silicon Valley. Thus, any legislative and regulatory streamlining of the process of implementation of recycled water projects would also assist local agencies in Silicon Valley in expediting their own recycled water projects.

The Task Force recommendations to overcome the obstacles enumerated above are multi-faceted, involving legislation, funding, high-level involvement in confidence-building, and more research. All these recommendations, when implemented, will assist in increasing recycled water usage in Silicon Valley.

Stakeholder Interviews and Industrial Survey

The primary source of basic data for the present study was a series of interviews with water recycling stakeholders, and a mailed-in survey of potential customers of recycled water in Silicon Valley. These efforts were conducted over a two-month period of March through April, 2003. Some of the interviews were conducted in-person while others were via pre-arranged telephone appointments. Standardized questionnaires were used with slight variations to accommodate the different categories of respondents. A sample of the list of questions is presented in Appendix A. The number of interviews/surveys completed in each category is presented below:

Category of Respondent	Type of Interview	Number Attempted	Number Completed	Percent Completed
Industrial Representative	Telephone	2	2	100 %
Industrial Representative	Mail-In Survey	85	17	20 %
Environmental Activist	Telephone	5	2	40 %
Recycled Water Producer	In-Person	4	4	100 %
Recycled Water Producer	Telephone	3	3	100 %
Water Purveyor	In-Person	2	2	100 %
Water Purveyor	Telephone	2	2	100 %
Overall Statistics:		103	32	31 %

⁵ California DWR recycled Water Task Force, “Recommendations of California Recycled Water Task Force: Water Recycling 2030”, Draft: 29 April 2003. For the 79-page document (in .pdf format), visit the website: <http://www.owue.water.ca.gov/recycle/docs/FinalReport.pdf>

Even though no agricultural or landscape customers were contacted, their views are included below, based on specific customer class workshops held at the Santa Clara Valley Water District in 2002. The author participated as a panelist in the agricultural customers' workshop. In the following sections, the results of these stakeholder contacts are generalized by category, retaining the privacy of individual interviewees to the extent practicable. The individual views expressed with obvious conviction are reproduced herein without an attempt to smooth over the rough spots. The goal was to leave no singular view out of this White Paper, but to consolidate shared views into non-redundant items under each category of stakeholders.

Industrial Representatives

This largest category of interviewees, provided a highly uniform response pattern. Respondents were unanimously supportive of water recycling and indicated having direct personal knowledge of recycled water use. Most of them believe that use of recycled water is most appropriate for landscape irrigation and cooling towers. Most respondents doubted the usefulness of recycled water for processes that require "high-purity" or "ultra-high-purity" water, even after further treatment to meet public health standards. De-ionized (DI) water is commonly used in Silicon Valley in the highly contaminant-sensitive manufacture of electronic components.

Obstacles to use of recycled water in industry, as viewed by the potential customers of recycled water are:

- Inadequate quality of tertiary recycled water for direct use
- Higher cost of treatment to raise the quality of recycled water to levels, required by most Silicon Valley industrial processes requiring ultra-pure water,
- Lack of information or a track record for use of recycled water in high tech industry,
- Recycled water pipeline does not reach some potential customers
- Small size of flow for some specialized industrial processes would make it economically impractical to connect to a recycled water source.

Solutions offered to the primary obstacles to water recycling in the industrial sector included the following:

- Improve the quality of recycled water (preferably de-ionized water) at specific industrial sites,
- Create financial incentives—from local, state, and federal sources—to offset the additional costs of treatment
- Make more feasibility, health/safety, and reliability data availability for managers to be able to make logical decisions,
- Extend recycled water distribution system, and recycled water services, to reach more industrial customers,
- Encourage maximum internal water recycling
- Forge confidential agreements with industries, so as to be able to consult with them regarding their process water requirements.

Agricultural Customers

Agricultural customers appear to be considerably less well-informed about use of recycled water and its appropriateness than their industrial counterparts. Those who are familiar with the Monterey experience with ongoing use of recycled water for irrigation of food crops tend to be more supportive and less skeptical. Obstacles and fears cited by growers include:

- Buyers' potential non-acceptance of produce grown with recycled water,
- Long-term salt build-up in the soil and reduction in soil productivity,
- Yield reduction of crops due to higher salinity of recycled water,
- Public health impacts on farm workers and the consuming public,
- Liability in case buyers of crops sue over illness/death caused by pathogens and/or chemicals in recycled water, and
- Nutrient content of recycled water is not necessarily a benefit at all times and for all crops.

These perceived problems were cited by several farmers who also acknowledged the need for water conservation and eventual switch to use of recycled water. Nonetheless, the attitude was that the risk of diminution of profitability and long-term survivability of farming in the Silicon Valley as a result of switching to recycled water was unacceptable. Solutions proposed to overcome these obstacles included the following:

- Provide assurance that buyers and certification agencies (e. g., Organic Council) will accept food products irrigated with recycled water,
- Provide assurance that all applicable standards are met,
- Provide evidence that foreign markets accept crops grown with recycled water,
- Provide evidence of acceptance by government agencies to use recycled water,
- Assure farmers that government agencies regulating groundwater resources accept use of recycled water for irrigation and its incidental percolation into the water table,
- Provide recycled water at the farm under adequate pressure for sprinkler operation,
- Assure and provide evidence to farmers that heavy metals will not accumulate in the soil, and
- Provide educational materials to the public so that a negative image toward produce grown with recycled water does not develop. Such negative image is usually based on stigma and prejudice, associating reclaimed water with its most recent past.

Landscape Irrigation Customers

Landscape customers participated in a meeting at the Santa Clara Valley Water District in December 2001. In the course of the discussions, the following concerns, fears, impediments and potential issues in the use of recycled water were cited by participants:

- Fears of Irrigation system failure due to inadequate recycled water pressure
- Concern for reliability of water supply, at times when recycled water treatment system is down,
- Need for quick communication, to alert customers in case a “bad batch” of water is released into the system,
- Uncertainty about safety of recycled water; (how safe is the water, can children be exposed? Should the water be further treated onsite to increase safety),
- Fear of odor from spraying recycled water,
- Subsidy to reduce cost of recycled water.

While some of these concerns may seem theoretical or speculative, they reflect the mood of some factions of the landscape community. Therefore, a thorough program of familiarization with recycled water is necessary in the various areas of Silicon Valley. Such a program may be patterned after the site supervisor training program conducted regularly by the South Bay Water Recycling program of the City of San Jose. Also, the San Diego County Water Authority sponsors an effective training program, which may be emulated.

In recent months, a group of opponents of use of recycled water for landscape irrigation in public parks and residential areas in Redwood City have voiced a variety of concerns over feared risks associated with recycled water. These fears are not typical of experience in other parts of the state—where hundreds of such sites have been irrigated with recycled water for decades without any adverse outcomes. However these fears and concerns are not indicative of the opposition that could develop in Silicon Valley, especially with adequate and continuous public information programs

Environmental Advocates

Interviews with environmental advocates and discussions with environmental justice community representatives pointed out numerous potential issues with the use of recycled water. In general, the environmental advocates are conditionally supportive of use of recycled water. The conditions for their support range from technical issues to community growth concerns and assurance of adherence to principles of environmental justice. Technical issues most commonly cited included:

- Presence of endocrine disruptor compounds (EDCs) and their potential fate and transport in the environment as a result of using recycled water,
- Health impacts associated with less-well treated reclaimed waters (secondary effluents allowed for some specified uses), and
- Groundwater impacts, primarily from increased salt content, as a result of irrigation over unconfined potable water aquifers.

It would be difficult to predict where the environmental community might stand vis-à-vis a given future water reuse project. In some cases, they have stood solidly behind projects and helped get community support for it, as in West Basin Municipal Water District projects and the City of Los Angeles' moribund East Valley groundwater recharge project. In other situations, the environmentalists have sided with the opposition, as in the Livermore Valley's Water Revival Project. It would be most prudent for a project sponsor to consult with local environmental leaders thoroughly, before launching a major recycled water project plan.

Producers of Recycled Water

Six producers of recycled water in Silicon Valley were interviewed for this study, five of them in person, using a standard interview format specifically designed for this group of stakeholders. This group was generally the most enthusiastic advocate of expanded use of recycled water. They provided an exhaustive list of reasons why use of recycled water was a good idea, ranging from water supply benefits to environmental enhancement to water supply reliability and watershed management theories. Reducing discharge of wastewater effluent to the San Francisco Bay was advanced by some as a significant advantage of water recycling, primarily as a means of ultimately achieving the federal government zero-discharge goal of the Clean Water Act. Others saw no advantage in reducing discharge and no evidence for discharge as a cause of salt-marsh conversion. All recognize that discharge of treated wastewater effluent helps improve circulation and flushing at the extremity of San Francisco Bay, a necessary function.

Obstacles to water recycling, as viewed by the producers of recycled water are:

- Institutional problems, wherein the authority and responsibility for water supply is so completely divorced from the authority and responsibility for wastewater management that critical water recycling functions (planning, funding, construction, distribution, daily operation) fall through the wide gap between the two entities,
- Service duplication (anti-paralleling) laws, wherein water purveyors (public and private) are given a monopoly within their designated service areas to protect their investment in water production, treatment, and distribution systems by adding their usual customer retail markup to the cost of recycled water.
- Perceptions by the water wholesaler, whereby the water wholesaler may hinder the efforts of retailers willing to distribute recycled water, for a variety of reasons,
- Public concerns, (such as those expressed recently in Redwood City) about the use of recycled water for irrigation of residential landscaping (including fear of loss of property values, fear of health risk to children, fear of long-term chronic disease, fear of loss of landscape materials, etc.),
- Higher levels of salt in recycled water, potentially resulting in customer resistance and difficulties in marketing recycled water,
- Cost of retrofitting existing distribution systems and financing new infrastructure projects,
- Inappropriate regulations as found in plumbing code,

- Difficulty in expressing long-term value (including environmental benefits) of recycled water in monetary terms, and quantifying value in ways that public officials can use to make difficult financial decisions
- Unfounded concerns about the safety of recycled water raised by interest groups through misinformation or “Bumper sticker” campaigns as a cover for other issues e.g. growth, market share, political advantage

Solutions offered by this group of interviewees include the following:

- Invest in public education,
- Match water quality to the intended use,
- Aggressively protect the groundwater reservoirs by providing additional levels of treatment to recycled water,
- Exempt recycled water from the Water Service Duplication Act (anti-paralleling, see footnote on page 5)
- Take advantage of the next drought to promote water recycling projects and increase public awareness and support,
- Obtain federal and state grants and low-interest loans,
- Support research on economics of water recycling,
- Delegate all responsibility for distribution of recycled water to a new Joint-Powers Authority or to Santa Clara Valley Water District,
- Increase support (by SCVWD) for recycled water projects (subsidies, grants, etc.), and
- Forge partnership with water supply agencies, to improve recognition of the full value of water.

Water Purveyors

Interviews were conducted with a director and an executive of the Santa Clara Valley Water District (wholesaler of water throughout Silicon Valley), and with representatives of San Jose Water Company, and Great Oaks Water Company. This group of stakeholders was generally ambivalent about recycled water, expressing highly qualified support. Nearly all agree that recycled water should be a component of the future water supply for the region as it increases reliability of water supply for the community. An exception to this opinion was heard from a private water purveyor, insisting that any recycled water used for irrigation should be of potable quality to avoid affecting the quality of the groundwater. The unconfined nature of the potable aquifer and the proximity of the water table to the ground surface were cited as reasons for concern by the water company, that relies entirely on its wells for water supply to its customers.

Appropriate uses cited for recycled water in the immediate future included landscape irrigation, industrial uses, and agriculture. Indirect potable reuse, through groundwater recharge was advanced as a long-term future option. Again, the private water company

dissented with a note of caution: Use recycled water only for closed-loop systems (toilet flushing, cooling towers, commercial laundries, etc.), where the water does not touch the ground in the southern part of Santa Clara County.

Obstacles cited (verbatim, in most cases) for increased use of recycled water were:

- Bureaucratic slow-downs and unenthusiastic championship of the water recycling program,
- “Incompetent management” (lack of entrepreneurial spirit, disregard of bottom-line results, inadequate emphasis on efficiency, etc.)
- Lack of incentives for customers to convert to recycled water reuse,
- Relatively high salinity of recycled water, compared with existing potable supplies
- High cost of recycled water systems, compared with existing potable supplies
- Water supply is adequate; there is a lack of need for recycled water; “recycled water is an artificially induced product”,
- Public perception,
- Protection of groundwater system, and
- Technical understanding of the safety of recycled water by some potential customers.

Solutions advanced by the water purveyors included the following:

- Privatization of at least a part of the recycled water system,
- Lowering of the costs by cutting out intermediaries,
- Improving recycled water quality by lowering total dissolved salts,
- More enthusiastic approach to marketing recycled water,
- Advanced treatment of all recycled water flow to full Reverse Osmosis,
- Partnerships for supplemental funding, improved technology, better cost accounting for comparison with alternatives,
- Top-level political support and leadership; “water is water”, and
- Encouragement of the high-tech industry to use recycled water; this sector is in the best position to understand the technical merits and safety of use of recycled water for cooling, process, and other applications.

Conclusions

It is noteworthy that the obstacles enumerated by earlier surveys, the Recycled Water Task Force, and the present study reveal persistence of certain themes—public attitudes, institutional gaps, economics, and costs, to name a few. Diversity of opinion, in the details of the issues raised, is to be expected among the stakeholders and among the customers, with

regard to the use of recycled water. Concentrating on the areas of broad agreement among the stakeholders, the following conclusions are drawn:

- Recycled water is an important component of the overall water supply and its reliability for the future of Silicon Valley community and its economic health,
- Landscape irrigation is the most appropriate—and the most widely accepted—use of recycled water in Silicon Valley,
- Industrial use of recycled water is limited to those industries where water quality is not as critical (e. g., paper recycling) or to non-process uses, such as cooling towers, wash-down and toilet flushing. The quality of recycled water would have to be improved greatly (either at the treatment plant, or at the industrial site) to make it usable for high-tech electronic applications—as is done currently at West Basin MW District,
- Potential for agricultural use of recycled water is fraught with challenges of perception and uncertainty on the part of the customers and the water purveyors,
- Aggressive protection of the groundwater quality is a universal goal in Silicon Valley, although the approach to reaching the goal is not always the same,
- Indirect potable reuse is a future possibility after further improvements to the recycled water quality and pilot studies to provide a sound basis for decision-makers,
- Public education, public involvement, and dissemination of water reuse safety and other technical information to a wide-ranging group of potential customers is necessary to build community-wide support and to offset possible oppositional groups or politicians,
- Maintaining meaningful contact with the environmental community (including environmental justice advocates) is essential to ensure that this influential group moves to and stays on the support side of water recycling,
- Economic valuation of the benefits of a new supply of water, based on a thorough appraisal of its full range of services, including long-term benefits to the environment, is necessary in order to provide decision-makers with a fair quantitative measure of the benefit/cost ratio of water recycling projects,
- An energetic and visionary champion for water recycling is necessary to expand the customer base rapidly (salesmanship, marketing, conveying value), and to provide timely system expansions to serve the increasing demand for water,
- Existing institutional arrangements and legal framework of responsibilities and restrictions make expanded marketing of recycled water difficult,
- Partnerships among public and private water cycle agencies, or formation of a single-purpose joint-powers authority, can resolve some of the existing institutional obstacles,
- An effective source control program, specifically aimed at minimizing salt discharges into the sewers, is necessary to lowering salinity and thus increasing customer acceptance of recycled water⁶. Other pollution prevention initiatives for other chemicals of concern must also have community-wide visibility and effectiveness,

⁶ In 1999, the legislature passed a compromise bill that allowed local entities to restrict the sale and installation

- Dedication to aggressive protection of the groundwater system is important, both in practical terms and in terms of perception. This may mean producing a higher degree of recycled water quality than necessary to maintain current groundwater quality (non-degradation policy), and beyond the current regulatory requirements.

of self-regenerating water softeners (SRWS) if they could meet these criteria: (a) they were already out of compliance with waste discharge or waste water recycling permit, (b) they had already restricted all other sources of brine, (c) they performed an independent study to quantify those sources, and (d) they found, from the available evidence, that restricting water softeners was necessary for the entity to comply with standards. AB 334 was introduced in 2002 by Representative Jackie Goldberg to remove some of the onerous restrictions in the legislation and to make it somewhat easier for local entities to restrict sale and installation of SRWSs. This effort has faced fierce opposition by the Water Quality Association, the lobbying arm of point-of-use water treatment device manufacturers and marketers. Compromises with the industry have resulted in a highly diluted bill that will make little difference in the ability of a local agency to limit brine discharge into the sewer system from this source. The bill was recently (6/5/2003) referred to the Assembly Committee on Environmental Quality.

Recommendations

Based on the conclusions, above, the following list of recommendations is offered for consideration and possible implementation by the various stakeholders, and by the Silicon Valley Pollution Prevention Center.

Recommendation	Implementing Entity
o Encourage the consolidation of responsibility for wholesale distribution of recycled water throughout Santa Clara County—as already preferred by the collaborative process—either in a newly created joint-powers authority, or by having SCVWD assume full responsibility and authority in this arena,	SCVWD, San José, Santa Clara, Sunnyvale, Palo Alto, Gilroy
o Design a multi-faceted and comprehensive, multi-media public information program, aimed at the general public and at specific communities, specifically agriculturalists, landscape irrigators, industries, groundwater pumpers, others.	SCVWD, City of San José SBWR, SCRAW, WVSD, SVP2C
o Seek funding for implementation of public information and outreach campaigns,	SVP2C
o Engage the environmental community in dialogue and seek support, endorsement, and participation in outreach to various community groups,	SVP2C
o Commission an economic valuation study of recycled water’s role in the long-term water security of Silicon Valley,	SVP2C
o Develop and nurture water recycling champions for Silicon Valley, at the highest levels of authority, nurture support for water recycling from the Boards, Councils, other governing bodies,	Future JPA, or SCVWD/City of San José, SVP2C
o Seek funding for a controlled pilot project to investigate the impacts irrigation and of groundwater recharge on aquifer water quality parameters of concern (salinity, contaminants of emerging concern, microbiological indicators, etc.) under various treatment regimes,	SCVWD
o Advocate for passage of ordinances to control and gradually phase out self-regenerating water softeners in Silicon Valley,	SBWR, Cities
o Draft model local ordinances for establishing required uses of recycled water when purple pipelines are within practical proximity of new or redevelopment projects. Campaign for widespread adoption of such ordinances,	SCCAPO, Cities
o Exempt recycled water from Water Service Duplication Act	WateReuse
o Take full advantage of drought episodes to increase public awareness and support for water recycling.	All

Acknowledgments

Mr. Pat Ferraro managed the project for SVP2C and provided indispensable facilitation and introductions. He allowed the consultant professional freedom of judgment and unlimited access. Ms. Trish Mulvey provided valuable contacts and insightful editorial comment and corrections on the initial draft of the White Paper. Ms. Margaret Bruce provided contact information for over eighty industrial water customers, which formed the basis for the survey. Dr. Harold Bailey provided exquisite peer review.

The author is indebted to the individuals listed below, for giving their time and attention generously in responding to questions regarding their operations, their personal views and opinions, and their professional judgment. Without their full cooperation, this White Paper would have lacked realism and deep practical insight.

Name	Affiliation
John Addeo	City of Sunnyvale
Michael Bangs	Juniper Networks
Leanne Bernhardt	Nortel Networks
Donna Blitzer	University of California
George Booth	Linear Technology
John Bradley	ASML
John Paul Bruno	Cadenco Design
Tom Cooper	Intel
Alan Gardener	Great Oaks Water Company
Jim Gasser	SCRAW
Andrew Gere	San Jose Water Company
Martha Guzman	UFW
Dave Holmes	Ultratech Stepper
Charlie Hoock	Calpine Corp.
Amy Hui	Environmental Justice Coalition for Water
Frank Jesse	BEA Systems
Bud Mission	Roche
Ted Olsson	IBM Corporation
Leslie O'Rourke-Garrett	Incyte Genomics
Bob Reid	WVSD
Melanie Richardson	SCVWD
Cindy Robins	Intuit, Inc.
John Roeder	Great Oaks Water Company
Eric Rosenblum	City of San José
Robin Saunders	City of Santa Clara
Ron Scholtz	ADI
Michael Stanley-Jones	Clean Water Action
Daisy Stark	City of Palo Alto
Mark Tenbrink	Micro Metallics Corp.
Daryl Wong	City of Milpitas
Rick Woodling	US Filter
Elizabeth Zimmermann	Hitachi Global Storage Technologies, Inc.
Greg Zlotnick	SCVWD

APPENDIX A

LIST OF QUESTIONS USED IN INTERVIEWS WITH STAKEHOLDERS

Potential Industrial Customers of Recycled Water

1. Do you support use of recycled water in Silicon Valley
2. For what uses do you find recycled water most appropriate?
3. Are you familiar with water recycling projects in this area?
4. Have you seen recycled water in use?
5. How much water (approximate AFY) is used in your industrial operations?
6. Which processes might be able to switch to using recycled water?
7. Why would the other processes not be able to switch?
8. Would you support use of recycled water in your own industrial operations and/or landscape irrigation—as a substitute for potable water?
9. What would it take to make the switch more attractive?

Producers of Recycled Water

1. What is your view of the role of recycled water in the overall water resources mix for Silicon Valley?
2. Do you agree that reducing discharge of wastewater effluent to the San Francisco Bay is beneficial to the Bay ecology?
3. For what uses do you find recycled water most appropriate?
4. How aggressive is your organization in expanding uses of recycled water?
5. What are the top three obstacles to more aggressive expansion of the system?
6. How can these problems be resolved to your satisfaction?

Water Purveyors

1. Do you believe that our potable water supplies are adequate for the foreseeable future?
2. What is your view of the role of recycled water in the overall water resources mix for Silicon Valley?
3. Do you agree that reducing discharge of wastewater effluent to the San Francisco Bay is beneficial to the Bay ecology?
4. Do you believe that recycled water use increases the reliability of the water supply for a community?
5. For what uses do you find recycled water most appropriate?
6. How supportive is your organization to expanding uses of recycled water?
7. What are the top three obstacles to more aggressive expansion of the system?
8. How can these problems be resolved to your satisfaction?

Environmental Activists

1. Do you believe that our potable water supplies are adequate for the foreseeable future?
 2. What is your view of the role of recycled water in the overall water resources mix for Silicon Valley?
 3. Do you agree that reducing discharge of wastewater effluent to the San Francisco Bay is beneficial to the Bay ecology?
 4. Do you believe that recycled water use increases the reliability of the water supply for a community?
 5. For what uses do you find recycled water most appropriate?
 6. How aggressive is your organization in expanding uses of recycled water?
 7. What are the top three obstacles to more aggressive expansion of the system?
 8. How can these problems be resolved to your satisfaction?
-

APPENDIX B

LIST OF ACRONYMS

DWR	Department of Water Resources
EDC	Endocrine Disruptor Chemicals
JPA	Joint-Powers Authority (Agreement)
MF	Microfiltration
RO	Reverse Osmosis
SBWR	South Bay Water Recycling
SCVWD	Santa Clara Valley Water District
SVP2C	Silicon Valley Pollution Prevention Center