Proposed Redwood City Recycled Water Project
Public Information Forum

September 16, 2002

Introduction

Redwood City is 100% reliant on one source of drinking water supply, the San Francisco Hetch Hetchy regional water system. Currently, the City is consuming approximately 1,000 acre-feet per year (AF/yr) over our contractual supply assurance of 12,243 AF/yr. The *Redwood City Water Use Forecast for 2000 to 2020*, dated June 20, 2002, includes water supply projections associated with future housing, employment, and population. Based on the forecast and recent planning, the City will need additional water supplies to meet both current and future needs. The goal of Redwood City is to get within the city's contractual entitlement of Hetch Hetchy water by 2010 by investigating and utilizing other sources. To supplement the city's water supply, the City Council is currently considering a proposed project to recycle wastewater for irrigation of public parks, commercial sites, and the common areas of approximately 50 homeowners associations east of Highway 101, as well as some industrial uses in the area.

To discuss the proposal, a Public Information Forum was held on September 16, 2002 at Sandpiper Community Center, located at 797 Redwood Shores Parkway. Approximately 100 Redwood City citizens attended the meeting. Mayor Dick Claire convened the meeting, thanked community members and panelists for their participation, and reviewed the meeting purpose and role of the City council. Bonnie Nixon of Public Affairs Management reviewed the meeting agenda, logistics, and ground rules, and facilitated the meeting. Thirteen panelists attended the meeting to respond to questions from the following four major subject areas: public health and safety; plants/landscaping and water use; implementation and regulations; and public perception/acceptance.

Panelists (see attached "Panelist Information" sheet):

- Dr. Timothy Berger, MD – Physician and Professor of Clinical Dermatology, UC San Francisco
- Jim Bewley – Manager, South Bayside System Authority
- Bob Castle – Water Quality Manager, Marin Municipal Water District / Co-Chair, Legislative and Regulatory Committee, WateReuse Association
- Barrie D. Coate – Consulting Arborist & Teaching Instructor on Plants & Trees
- Dr. M. Ali Harivandi – Regional Advisor on Turf, Soil & Water, UC Cooperative Extension
- Bob Hulquist – Chief, CA Department of Health Services Drinking Water Technical Operations Section
- Paul Lofholm – Clinical Professor, UC San Francisco
- Mark Millan – Specialist, Public Information and Involvement for recycled water projects
- John Ruetten – President and Co-Founder, Resource Trends, Inc.
- Stephen C. Volker – Environmental Attorney
- Bob Whitley – Authority Manager, Alameda Contra-Costa County joint water recycling project / Co-Founder, WateReuse
- Warren "Chris" Willig – Principal, Environmental Water Management
- Brian J. Zamora – Director of Public Health, San Mateo County Health Service Agency, Public Health and Environmental Protection Division

The following notes were recorded on flip charts during the public information forum, and transcribed later by Public Affairs Management. These notes have been minimally edited and grouped by subject area for readability. The content of questions asked, concerns raised, and responses made, however, have not been altered. VHS video tapes of the event are now available at the Redwood City Main Library, Reference / Information Desk.

Professional opinions expressed by panelists in the course of this event do not necessarily reflect the City's position on issues and concerns raised by the audience, nor should readers assume that all comments are factually complete or correct. While there was a lively 'point-counterpoint' tone to the panelist's remarks,

the City Council did not intervene with their own clarifying questions, nor did they challenge panelists' responses. And, not all questions or concerns raised were answered that evening. City staff will provide additional information and their own responses to some of the comments made and the City Council will continue to ask their own questions as this public dialogue continues.

Background

Problem Statement:

- Redwood City does not have enough water now and into the future

Solutions:

- Solutions are limited, especially within the next 15 years
- More water conservation alone is not enough
- Recycling is the most viable local supply option now

Goal:

- Get Redwood City back within supply assurance by 2010

Purpose of Meeting:

- No decisions will be made tonight
- Focus on proposed water recycling for landscape irrigation and industrial uses
- Ask questions and state concerns
- Redwood City Council and Staff are all present to listen & learn
- Council Members stated that they will be asking their own clarifying questions at a later time

Topic 1 - Public Health/Safety

- What is in recycled water?
  - *Hultquist:* Recycled water from municipal domestic wastewater is treated to remove contaminants. The treatment process includes physical and biological barriers/removals and disinfection. Essentially no harmful organisms are in that water at all.
  - *Hultquist:* Because it is treated to California's high standards, recycled water is a very good quality
  - *Hultquist:* The chemical quality of recycled water meets drinking water standards for constituents that are known and regulated (except for nitrogen which is beneficial for irrigation purposes).
  - *Hultquist:* Recycled water includes various minerals and organic chemicals similar in those found in treated drinking water.
  - *Bewley:* Pathogens or disease-causing organisms are dealt with by the treatment process.
  - *Bewley:* Because recycled water originates from high quality drinking water, it is still a good quality of water for irrigation purposes.

- What assurances are there that recycled water is healthy (i.e. will not make our kids and pets sick)?
  - *Zamora:* Regulatory oversight by various agencies.
  - *Zamora:* Recycled water plumbing systems are separate and distinct from drinking water systems. Separate colored piping and back flow prevention devices are installed and tested routinely to ensure drinking and recycled water systems are separated.
  - *Hultquist:* Regulations for water quality that take into account exposure levels from various behaviors and various age levels (children are more sensitive).
  - *Bewley:* There are fewer heavy metals that are harmful to aquatic organisms but not harmful to humans, and are even beneficial in some cases.
  - Smaller trace constituents found in recycled water will continue to be researched.

- What about pharmaceuticals in wastewater - how are these accounted for?
  - *Lofholm:* There is some concern that water regulations and water quality standards do not address pharmaceuticals found in the water system. Water sampling has shown levels in California as high as 70% for certain chemicals.

- *Lofholm:* The technology to address some of these small concentrations is finally available but the Department of Health Services (DHS) has not had not yet addressed pharmaceuticals. DHS is concerned about pharmaceuticals in wastewater intended for potable uses (drinking water uses), not non-potable uses. The water use proposed here is for non-potable use.
- *Lofholm:* DHS is looking into recycling unused/unwanted pharmaceuticals so that they do not enter the water system. The legislature has passed laws to prevent facilities that use large amounts of drugs from disposing of them in the sewer system.
- *Lofholm:* Children, pregnant women, and those with immune deficiencies may be more at risk from pharmaceuticals.
- *Hultquist:* Regulations for non-potable reuse do not address the health effects of pharmaceuticals because the exposure associated with non-potable use does not warrant it.
- *Hultquist:* Existing regulations deal primarily with exposure to pathogens (viruses, bacteria, parasites) which the treatment process is tailored to remove. There is some question within the industry whether pharmaceuticals pose a risk and should be of concern.
- *Hultquist:* Low levels of pharmaceuticals are found in numerous waters that provide beneficial uses such as swimming and drinking.
- *Berger:* Exposure would have to be through open wounds or the inhalation of large amounts to be dangerous. By dilution the amounts of pharmaceuticals would be small in large amounts of water.

- Have any negative health effects associated with contact with recycled water been documented?
  - *Zamora:* Not aware of any illnesses in San Mateo County that have resulted from recycled water.
  - *Hultquist:* Incidents where recycled wastewater has been accidentally consumed have been documented. Even in these cases of exceptional exposure, no adverse health effects were observed.
  - *Hultquist:* Microbial risk assessments were conducted by UC Davis and are available for review.

- Have there been any health-related lawsuits associated with the use of recycled water?
  - Panelists are not aware of any health-related lawsuits.
  - *Volker:* Involved in lawsuit filed last year by Great Oaks Water Company against San Jose's Recycled Water Project because tests conducted by Montgomery Watson showed that the recycled water exceeded drinking water standards. Montgomery Watson found the recycled water had concentrations of NDMA (a known carcinogen) eight times greater than the EPA standard. Elevated levels of trihalomethane (THMs) were also discovered. Although the San Jose water was proposed for irrigation and cooling purposes only, it was determined that these constituents were likely to contaminate the groundwater aquifer from which San Jose draws its drinking water supply.
  - *Volker:* Recycled water injected into groundwater aquifers has resulted in NDMA contamination and numerous well closures in Orange County.
  - *Volker:* Numerous studies document the health impacts of NDMA.
  - *Volker:* Redwood City's proposal does not include testing for NDMA or THMs. Testing for NDMA contaminants is very expensive.
  - *Bewley:* Regarding NDMA and THMs, our analytical abilities to determine the levels of certain minute constituents in groundwater have exceeded our ability to know what those levels mean in practical terms. In some cases we are measuring in parts per quadrillion, almost to the molecular stage. The challenge now is what does that mean.

- If you were asked to accept recycled water in your neighborhood, would you?
  - *Zamora:* Yes, I would be very comfortable with recycled water used to water my front lawn.
  - *Bewley*: Yes, I work around recycled water every day and have never experienced a problem. Those who work in wastewater treatment plants have the highest exposure, but there have been no measurable health problems related to this exposure.
  - *Berger:* Probably yes, if I had some control over its application.

- Is recycled water a risk to the groundwater in Redwood City?
  - *Bewley:* No, there is no groundwater aquifer or underground drinking sources in Redwood City. What exists is essentially salt water.

- Has any research been conducted on the health impacts of using recycled water for non-potable use? What about the unregulated compounds found in *treated* wastewater?
  - Studying and addressing the health effects of unregulated compounds in recycled water is a top priority of the EPA.
  - Recycled water of a non-potable standard contains various chemical compounds that are unregulated.
  - *Berger:* The irrigation of a golf course in Australia using recycled wastewater resulted in the emergence of a microbacteria and an associated condition. Microbacteria in water sources are difficult to assay, however.

- At the August 28th City Council meeting, I stated that there is an odor in the recycled water from the pilot? I have samples from the sprinklers. What is causing this odor?
  - *Bewley:* One standard for drinking water is taste, color, and odor.
  - Samples of Hetch Hetchy water, effluent from the SBSA wastewater treatment plant, and SBSA recycled water are all provided in the back of the room.
  - *Bewley*: The odor of recycled water would likely smell like your hot tub or swimming pool.
  - *Bewley* agreed to have the technical services analyst test the water sample collected by the meeting attendee, and provide a response.

- To what level is wastewater currently treated and what bacterial tests are currently done?
  - *Bewley*: Water intended for discharge to San Francisco Bay undergoes primary and secondary treatment, which is the standard. It then undergoes filtration and disinfection. To meet DHS standards for restricted use, a chemical coagulant is added to reduce turbidity and increase the efficiency of filtration. This carries with it a chlorine residual that results in pathogen free water.
  - *Bewley*: The standard for pathogen testing is total coliform. This is not the pathogen of concern but has been identifies as an indicator pathogen. Turbidity, oxidation, and chlorine content requirements must also be met. This bacterial test is confirmation that the treatment process is working.

- How can you assure that pathogens will not proliferate in recycled water?
  - *Hultquist*: The treatment processes employed since the 1970s have been shown to be very effective in removing pathogens, especially the combination of filtration and disinfection.
  - *Hultquist*: Incidences where pathogens such as fecal coliform are found is evidence that the treatment process (and the treatment plant) is working.

- What assurances are there that an acceptable quality of recycled water will be maintained into the future and once the system is in place? Consistency of quality over the long-term is very important.
  - *Whitley:* Quality assurance is provided by the regulatory oversight of DHS, the Regional Water Quality Control Board (RWQCB), the San Mateo County Health Department, local water utilities, and others.
  - *Whitley:* The local water utility is personally, financially, and potentially criminally liable if adequate water quality is not maintained.
  - *Whitley:* Recycled water projects are one of the most regulated projects a utility can provide to a community.

- Are there potential impacts on children or pets who may drink recycled water?
  - *Castle*: California has the most stringent water recycling regulations in the world.
  - *Castle*: In thousands of applications throughout the US, there has never been a documented illness associated with recycled water use. In many of these applications, the exposure was even more intimate than that which is being proposed for Redwood Shores.
  - *Castle*: Recycled water is highly regulated, monitored, and tested.

- What are the differences between potable water and recycled water?

- *Castle*: There is a realistic comparison between the contaminants in recycled water and the "contaminants du jour" in potable water. However, keep in mind that the use being proposed for Redwood Shores is for landscape irrigation only.
- *Whitley*: Technology has vastly improved the feasibility and applications for using recycled water.
- *Whitley*: Recycled water carries the same level of protection as drinking water.

- Could there be any negative health implications for wildlife in man-made lagoons as a result of recycled runoff?
  - *Bewley*: The man made lagoons in this area are saltwater lagoons and do not contain fresh water.
  - *Bewley*: Wildlife frequently visit the primary treatment ponds of wastewater treatment plants.
  - *Lofholm*: Recycled water as a vector for the transmission of disease to bugs/birds should be considered and closely monitored.
  - *Volker*: Public awareness of undisclosed health risks sometimes leads to regulations being made more stringent. There must be full disclosure of all of the constituents in recycled water that might pose a health risk.
  - *Volker*: There may be some long-term "sleeper" issues of which we are not aware. A long-term review of the cumulative effects on wildlife is necessary.

- Could the health effects associated with exposure to recycled wastewater be delayed? Am I going to get sick 30 years from now?
  - *Whitley*: Recycled water has been used throughout the world for more than 90 years.
  - *Lofholm*: Perchlorate contamination has recently been associated with thyroid problems but this connection went unseen for a very long time. Other sleeper issues include DDT and asbestos.
  - Special attention must be paid to the unknown health impacts of estrogens.

- What are the risks of accidental connections or inadvertent consumption of recycled wastewater?
  - *Bewley*: Accidental connections would be noticed at the treatment plant.
  - *Hultquist*: To date there have been several accidental cross connections between potable and non-potable recycled water systems in the country. Even in these cases, no ill effects occurred.

- What are the risks of the treatment plant failing or failing to identify a risk?
  - *Castle*: On-line instrumentation measures key parameters in wastewater, wastewater recycling, and water plants so upsets are immediately spotted.
  - *Castle*: There is a very low risk of treatment plant failure.

- Who would be liable if someone becomes sick from drinking recycled water?
  - *Bewley*: SBSA and the City of Redwood City.

Topic 2 - Plants/Landscaping/Water Use

- It is documented that some plants are negatively impacted by exposure to recycled wastewater. How can this be prevented?
  - *Coate*: It is true that some plants are negatively impacted by exposure to recycled water.
  - *Coate*: Redwood trees are dying in Milpitas because of recycled water.
  - *Harivandi:* California has used recycled water for irrigation purposes for between 30 and 40 years as have many other parts of the country.
  - *Whitley:* Recycling water for landscaping began in Golden Gate Park in the 1920s.
  - *Harivandi:* Potential problems should be identified and dealt with before use begins.
  - *Harivandi:* Recycled water is not the best for irrigation purposes because of salt content. However it is possible to manage salinity concerns.
  - *Harivandi:* Turf and landscape management considers what is dissolved in recycled wastewater, such as salts and other solvents.
  - *Harivandi:* It is important to evaluate potential problems before the system is converted, and to take preliminary actions to mitigate them.
  - *Willig:* There are various actions that are taken before an area is converted to recycled water.
  - *Willig:* Minimizing pooling and runoff are helpful management practices to maintain plant health.

- The Plant Materials List distributed does not only include plants that are common to Redwood Shores. How much will our existing plants be damaged?
  - *Coate*: The Plant Materials list is partially out of date but does include plants tolerant of high salt exposure and low permeability soils. It is a partially obsolete list however.
  - *Coate:* Most of the plants on the list will tolerate recycled water if it applied with well-managed irrigation systems. I would encourage you to look at a new list and to not replace species as they decline.
  - *Willig:* The Plant Materials List is a 25 year old list that was developed during the development of Redwood Shores.
  - *Coate:* It is not wise to only use plants that are tolerant of recycled water – like those listed on the Plant Materials List handout – because many of these have other assorted problems.

- I made a list of 89 plants/trees in Redwood Shores which I could identify, and only 12 of these are described as salt tolerant. What will recycled water do to trees and plants that are already established? Will recycled water have any effect on trees and plants that are already sick? Will exposure to recycled water degrade these plants further?
  - *Coate:* The soil in the Redwood Shores area is very low-quality to begin with.
  - *Coate:* Backsplash of recycled water has been shown to kill some adjacent shrubs. This can be prevented by using drip irrigation instead of sprinklers.
  - *Coate:* I worry that the chemical problems Redwood Shores has will be worsened by recycled water.
  - *Harivandi*: I reviewed the soil tests done by Redwood City prior to and after one season of irrigation and found soil salinity increased by between one and six times the original salt content.
  - *Harivandi*: Sodium chloride can harden soil and make it impermeable.
  - *Harivandi*: This increase in soil salt content will occur slowly and can be minimized with flushing if dilution is not possible to push salts below the root zone.
  - *Harivandi*: Monitoring for salinity should be conducted before and after the rainy season.
  - *Harivandi*: Treatment using reverse osmosis or micro-filtration would remove more of the salts and should be considered if feasible.
  - *Harivandi*: Acid injections can also help to minimize soil salt buildup.
  - *Harivandi*: Potential problems should be accepted and proactive remedial actions taken to minimize these problems.
  - *Willig*: Short run times, multiple starts, and increased aeration can help to minimize salt buildup.
  - *Willig*: To date, there have been no demonstrated problems with salt buildup caused by using recycled water for irrigation.
  - *Willig*: Most existing plants will tolerate the well–managed application of recycled water.
  - If the program is implemented, a mitigation program should be implemented for plants that do die as a result of using recycled water.
  - Guidelines developed in 1981 for our Homeowners Association that are suitable for planned use development state that plants must be replaced by permit and with like materials.

- Is there a health risk associated with recycled water splashing home grown vegetables?
  - *Willig*: Any water that meets DHS standards can be used for any agricultural purpose.
  - *Willig*: Even wastewater treated to the secondary level can be used for agriculture. There is a significant amount of agriculture that is irrigated with recycled water throughout the state.
  - *Harivandi*: Plants do not absorb pathogens or heavy metals like humans do.
  - *Holtquist*: In Monterey County, crops like grapes and strawberries that are eaten without washing are irrigated with recycled water. Testing has shown no deleterious residues on these crops.
  - *Castle*: In Marin County in the late-1980s, a pilot program was implemented during the last drought (in which residents were limited to 50 gallons per person per day) that allowed residents to use recycled water (instead of drinking water) to preserve their landscape. The pilot did not result in any deleterious health effects. In this sense, recycled water should be considered landscape insurance.

- Conservation is a preferred alternative. Conservation has a more immediate result and a better cost/benefit ratio. Is conservation a feasible option? All we have in Redwood City at this time is the toilet replacement program. Why aren't we implementing other conservation measures to reduce our drinking and commercial landscape water use?
  - *Millan:* Conservation should go hand in hand with recycling water efforts, but cannot fully address the shortages Hetch Hetchy users will be subject to in the future. Both practices should be implemented together. There is a value in reducing water use and in replacing potable water with recycled water where possible.
  - *Willig:* There are currently 1000 acre-feet of water being used for landscaping in Redwood Shores. If we improve conservation measures, we could potentially save 200 acre-feet. If we convert to recycled water, we could potential save 800 acre-feet.
  - *Ruetten:* The industry runs a risk of under investing in the water supply. Conservation can only go so far in the long term to ensure an adequate supply. The public health risk must be weighed against this risk of under investment. The community faces important investment decisions about the future of its supply.
  - *Volker:* In the long run, California must learn to employ conservation pricing and drought–resistent landscaping. Conservation will yield immediate results.
  - *Castle:* Recycling wastewater has the added virtue of reducing the mass of treated wastewater discharged to San Francisco Bay.
  - We should see what gains we can make with conservation first, and then look into recycling water.
  - A resident noted that much more of Redwood Shores should be using drip irrigation. The resident stated that Redwood Shores consistently over waters and has too many lawns.

- The public wants to use water resources more efficiently. What we oppose is that using recycled water is being proposed as mandatory. We want the opportunity to vote on this issue and to provide input into the process.
  - Those who are here this evening are obviously interested in this issue. Getting information to the general public would be the challenge in going to a vote. Education is a huge component in both conservation and recycling. Whether or not the issue goes to vote will be determined by the City Council.
  - *Volker:* The public should have the opportunity to make an informed choice. Whether or not to use recycled water is not a choice that should be made for them. This choice will have to be based on an adequate environmental review of the long-term options available, including conservation measures. Redwood City should insist on the highest quality review, testing, and disclosure so that the public feels comfortable with the decisions being made.

Topic 3 - Implementation / Regulations

- What will the project cost, including long-term financing? In your recommendation, who should pay for it?
  - Someone from Redwood City will reply to the meeting attendee on implementation costs for the project, which are undetermined at this time.
  - *Whitley:* All water customers of the utility should pay for this type of project unless you can clearly identify an expansion component or certain portion of the utility that is for new growth. Water is water. Using recycled water in one area will improve the water supply reliability in the entire area and as such, the cost should be spread out across the entire rate base.
  - *Claire:* The enterprise fund will likely pay for it, which represents all of the users.
  - *Castle:* The entire City should pay for the benefits of having a more reliable water supply. This is a reasonable allocation and keeps the costs of implementation realistic.

- Can you describe public concerns over Russian River water in Sonoma County? Why was MMWD testing for treated sewage at the discharge point?
  - *Castle:* Industrial and municipal effluent discharged to the Russian River led to public concerns over drinking water quality, as well as investigations and monitoring. Borderline levels of herbicides and estrogenic compounds were found in the raw water. However, this issue is not related to recycled water.

- *Castle:* In many cases, science and the ability to monitor for various constituents is still catching up with the technology that produces these constituents in the first place.

- Is the location of the airport a concern in terms of the wildlife attracted tot he treatment plant getting stuck in aircraft?
  - *Bewley*: No, the treatment plant is too far away from the takeoff/landing pad to be of concern.

- Regarding the mandatory use permit, what can the public do to influence the decision of whether recycled water will be used or not?
  - *Volker*: Public outreach and scientific disclosure have improved the opportunities for the public to give input into the process and the quality of scientific studies.
  - *Volker*: Agencies must concede that they are not aware of all of the long term environmental effects of using recycled water and provide for mitigation.
  - *Volker*: The public has a right to influence the decision–making process.
  - *Whitley*: The public must remember that the purpose of Redwood City's proposal is intended to maintain quality of life. The public needs to keep its eye on the problem, which is a real water shortage that must be addressed.

- Is Redwood Shores the first community to have a mandatory use ordinance?
  - *Whitley*: No, many communities in the US are required to use recycled water for non-potable uses and support this use for the benefits it provides. Many elements such as pricing are discretionary on the part of the city however.
  - *Ruetten:* Recycled water is our most valuable resource. Mandating the use of recycled water devalues the resource from a public standpoint.
  - *Volker:* The public should be allowed to choose whether or not to use recycled water. This decision should not be made without community consent.
  - *Volker:* An informed choice should hinge on long term environmental review and public outreach.
  - *Bewley:* If recycled water is not implemented, a mandatory ordinance prohibiting outdoor irrigation during a drought may be necessary.

- What are the posting requirements for areas irrigated with recycled wastewater?
  - *Hultquist*: The posting requirements are in the DHS regulations but would be implemented by the City of Redwood City.
  - *Bewley*: The regulations require placing readable signs in non-hazardous locations where recycled water is being used to irrigate areas that are accessible to the public.
  - *Volker*: Risk evaluations for small children, pets, and wildlife (who cannot read signage not to drink the water) must undergo adequate review.

- What infrastructure would be required to begin irrigating landscaping with recycled water, and who would pay for this infrastructure? How is it installed? Who would be responsible for maintenance?
  - *Bewley:* A small part of the system is already in place and was installed as part of the master development when the main arterials were installed. This is a small part of what would be required however.
  - *Bewley:* Pump stations and tanks would be located at the SBSA site.
  - *Bewley:* A 24-inch pipeline would be required and would feed into increasingly smaller pipes.
  - *Bewley:* No off site storage or pumping would be required as the plan is currently conceived. If the plan were expanded to the west of Highway 101 into central Redwood City, additional pumping would be necessary. However these would be relatively small structures that could be built underground.

- Who would pay for implementation of a recycled water system?
  - The specific cost of implementing a recycled water system in Redwood Shores has yet to be determined. (Residents noted that they have been requesting those costs for several months).

- *Bewley:* Recycled water projects have the potential for state and federal grants and loans assistance that could cover up to 20% of costs. The remainder would be financed by bonds or other means. In the end, the user would pay for it.
- Associated inspection and retrofit costs will factor into the total cost of implementation.
- *Ruetten*: Because the entire City would benefit from establishing a more reliable water supply using recycled water, it is reasonable to equally allocate the costs of implementing the system. The recommendation is that all users of the water utility should pay.

- What are the potential impacts on property values? Will values go down because of the numerous signs that say "Do not drink the water?"
  - *Millan:* In Sonoma County, dual plumbing has already been installed in new residential developments. The dual system is disclosed at transfer. Those sympathetic with environmental causes tend to perceive these as high value homes. Vintage Greens Homes, for example, increased in value at the same rate as the rest of the market. Recycled water systems are not seen as a negative, but are sometimes seen as a positive.
  - *Willig:* New developments in Contra Costa County that have installed dual-system plumbing have not decreased in value. Installing dual plumbing to irrigate with recycled water also has not increased development costs or pricing.

- Is it true that the City already purchased water tanks for storing recycled water?
  - No.

- Will pools, fountains, or other water features require separate plumbing as well?
  - *Bewley*: Recycled water would be allowed in a fountain, etc. or in a recreational lake. It would not be allowed in a swimming pool however.
  - *Harivandi*: The levels of nitrogen and phosphorous in recycled water will accelerate algae growth faster than potable water would.

Topic 4 - Public Perception / Acceptance

- If the City decides to go forward, would recycled water be cheaper?
  - *Ruetten*: This is a decision for the local officials. There is a trend in the industry to discount recycled water because it is not potable. However, when we are planning water supply reliability we are planning for maintaining a level service and supply during a worst case scenario such as drought. In drought, recycled water is more reliable than the potable supply because it is drought-proof. In a drought scenario, form an amount of supply standpoint, recycled water may be *more* valuable and should not be discounted because of quality, in my view.
  - *Ruetten*: Water is already subsidized. This has created a disconnect between the price of water and its value. This has led to under-investment in water.

- Why not increase the price of water to encourage conservation?
  - *Whitley*: The price of water is already reasonably high.
  - *Castle*: Conservation inducements such as MMWDs three tier pricing structure have resulted in use reduction but structural changes that do not rely on changing human behavior (such as low flow toilets, irrigation proscriptions) are shown to be more effective.
  - *Willig*: Per foot, installing the infrastructure necessary to distribute recycled water will be less expensive than replacing plant material that has died during a drought.
  - *Volker*: The cost of urban water is quickly approaching the cost of desalination and is being considered in some locations with severe water shortages. In Southern California, urban water sells for $2,000/acre foot.

- How does recycled water help with drought?
  - *Bewley*: Recycling wastewater will increase the supplies available for both potable and non-potable uses.

Comment Sheets

Health & Safety

- Water conservation should be a priority. Has this been fully considered? I support recycled water use too.
- To what level is the water treated (tertiary)? What bacterial tests are done? Since many bacteria + viruses are difficult to control in tap water how can you assume that these same biological contaminants won't proliferate in recycled water?
- Redwood Shores has man-made lagoons which use fresh water, what are the health implications of recycled water in the man-made lagoons? What are the long term effects on ducks and wild birdlife using the lagoons?
- If I am exposed to recycled water, will I get sick 30 years from now?
- If terrorist rent and apartment and dump bio/chemical agents in to his drain, will I be exposed to it?
- HOA's w/ pools & fountains or water features – separate piping?
- Irrigation water puddling on the ground is a source of fresh drinking water for water foul in the western flyway? How will this water effect birds?

Implementation/Regulations

- We've heard examples of minor flaws with recycled water that may affect a small group of users. Am I correct in my belief such flaws could be found in potable H2O if treatment processes fail> How are the control/testing processes different for recycles + potable H2O.
- Why more water conservation is not enough? Will economy slow down reduce our water needs? With economy slow down, will our water needs decrease?
- Why can't we increase water price to increase conservation of water?

Public Perception

- How much will this project cost & who will pay for it? We have asked this question a number of times
- Property value – property values going down?
- Why can't we evaluate non-residential areas first and begin conservation effects in residential areas? There may be new technologies that impose conservation? Not mandatory – not residential, devalues water.
- How do we decontaminate the perception that "treated wastewater" will harm them?

General Comment Sheets

- I understand it is too early to comment, but with the recent revelation of the SF Board of Supervisors diverting Hetch Hetchy maintenance money to pet SF projects, is it possible to sue them to pay a larger portion of the future restoration cost?
- As a homeowner at Lakeshore Townhouses I am concerned with the use of recycled water in the man-made lagoons in our community. My question is: Is it intended the recycled water be used in these lagoons instead of fresh water now used? How will recycled water affect the ducks and water birds who use the lagoons regularly on a daily basis?
- As a member of Lakeshore Townhomes Board of Directors, I would like to receive future information regarding recycled water for Redwood Shores. Thanks you. Will this include the Lakeshore "Lagoons"?
- Nice job in allowing this forum.

Panelist Information – September 16, 2002 Public Information Forum

Dr. Timothy Berger, MD is a highly regarded physician as well as a professor of clinical dermatology at UC San Francisco. He is the executive vice chair of department of dermatology at the university and the director of dermatology clinic and residency at the UCSF medical center. Dr. Berger is also the chair of the American Academy of Dermatology's task force on Sexually Transmitted Diseases and has contributed to nearly 100 scientific articles and 12 books.

Jim Bewley has a BA in Chemistry from San Francisco State and has a Certificate in Air Quality Management by UC Davis. He has over 30 years of wastewater treatment experience as plant operator, water & wastewater chemist, superintendent & manager. Jim has been the manager of the South Bayside System Authority since 1981.

Bob Castle has been a Registered Professional Engineer for 30 years and is the Water Quality Manager for the Marin Municipal Water District. He is responsible for the Water Quality Laboratory, Water Treatment Operations, the Recycled Water Program, and regulatory issues dealing with potable and recycled water. In the recycled water field, Bob currently Co-Chairs the Legislative and Regulatory Committee of the WateReuse Association.

Barrie D. Coate is a well known registered consulting arborist and specializes in analysis of plant and tree problems for a wide range of public and private sector clients. He holds a teaching certificate for California junior colleges and has been an instructor in the U.C. Cooperative Extension certification program. Mr. Coate has authored numerous books and articles about water-conserving plants and trees.

Dr. M. Ali Harivandi has an MS and a PhD in turfgrass management from Colorado State University. He is a regional advisor specializing in Turf, Soil, and Water at the University of California Cooperative Extension in the San Francisco Bay Area, where he began in 1980. Dr. Harivandi conducts seminars and workshops for turf and landscape professionals.

Bob Hultquist has an MS in engineering from UC Berkeley and is a registered professional engineer in California. He has 33 years of experience in public health engineering, drinking water quality, and water reuse. Bob is now Chief of the California Department of Health Services Drinking Water Technical Operations Section.

Dr. Paul Lofholm is a clinical professor at the University of California, San Francisco. He has won numerous awards and distinguished honors and has spoken in various public forums. He is a regular lecturer on therapeutic and contemporary issues in health care, and serves as chair / head of various practicum, clinical and business associations.

Mark Millan has specialized in public information and involvement for recycled water projects for over 10 years. Projects include a 42-mile pipeline for the City of Santa Rosa, carrying recycled water through Sonoma County's wine country, urban and rural areas. His firm also conducts surveys on public perceptions and understanding of recycled water uses that have been helpful in developing educational materials for communities that uses recycled water.

John Ruetten is President and Co-founder of Resource Trends, Inc., a market research and consulting firm dedicated to increasing investment in water and environmental enhancement. Resource Trends accomplishes this by helping private companies and public agencies articulate the value of investments in water, and beneficial reuse of water. John is active in the National WateReuse Association and speaks regularly at water and environmental conferences.

Bob Whitley is a graduate of UC Berkeley and is a professional engineer in California. He has over 36 years experience, including the planning, design, operation and program implementation of water recycling

projects throughout Calif. He is the Authority Manager for a joint water recycling project in Alameda/Contra Costa County and a founder of WateReuse.

Warren "Chris" Willig is a graduate of Cal State Northridge with a Masters from UC Davis in Horticulture. He has 25 years experience in landscaping and irrigation. For the last 15 years Chris has been Principal of his own irrigation firm, Environmental Water Management.

Stephen C. Volker is an environmental attorney and proprietor of the Law Offices of Stephen C. Volker. He is a recognized expert in several specialized fields of environmental law including water rights, water pollution, forest practices, land use planning, environmental review and agriculture land preservation.

Brian J. Zamora, REHS, MPH, is currently the Director of Public Health in the San Mateo County Health Services Agency's Public Health and Environmental Protection Division.

Bonnie Nixon is Vice President of Public Affairs Management, an environmental planning and communications firm with offices in San Francisco, Sacramento and Washington D.C. She has 18 years experience facilitating community relations programs and complex negotiations and disputes for dozens of water resources, land use and transportation projects.