Public Acceptance: The Greatest Barrier to Widespread Water Reuse

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Abstract Most knowledgeable observers would agree that the greatest barrier to the use of recycled/reclaimed water for various applications around the globe is gaining the acceptance of the public. Several highly qualified researchers have conducted studies on public perception and public acceptance over the past half-dozen years. Each of these studies has advanced the state of understanding of the public's reluctance to fully accept the use of reclaimed water, especially for indirect potable reuse. It is incumbent upon the water reuse community to move beyond gaining an understanding of public concerns to a phase in which we devise practical and workable approaches to the problem of acceptance. The water reuse community must formulate a basic strategy and then implement it. While it would be naïve to believe that every local situation is the same, it is possible for the global water reuse community to begin to agree on the basic elements of the strategy needed to ensure public acceptance. This paper will focus on these needed elements, which include common terminology, positive branding, research on microconstituents, embracing stakeholders, and communicating the value of water.
Keywords water reuse; terminology; public acceptance; branding; microconstituents

INTRODUCTION

Several researchers have conducted studies on public perception and public acceptance over the past half-dozen years. Hartley (2003) introduced five principles for involving stakeholders and building and maintaining trust with stakeholders. Ruetten (2004) introduced and described 25 "best practices" for developing indirect potable reuse projects. Russell and Lux (2006) obtained public responses to the general concept of water recycling and consulted with interest groups on water recycling. Jeffrey and Russell (2006) embrace three guiding principles for stakeholder/public involvement and emphasize the need for adequate information and opportunities for deliberation. Marks (2003) in her doctoral thesis focused on the development of trust in urban water recycling. Haddad *et al* is currently using "mental models" to develop an "understanding [of] the new urban customer." Each of these studies has advanced the state of understanding of the public's reluctance to fully accept the use of reclaimed/recycled water.

Experience shows that the public generally tends to be accepting of non-potable reuse applications such as irrigation of golf courses and highway median strips, use in industrial settings, and irrigation of non-edible crops. When the applications become more personal and involve human contact, there is much less public acceptance. This is especially the case when indirect potable reuse is proposed. Recent experiences in Toowoomba (Queensland, Australia) and San Diego (California, USA) serve to

demonstrate that even with a much greater understanding of public perception, the water reuse industry has a ways to go to gain *public acceptance* for indirect potable reuse.

It is incumbent upon the water reuse community to begin moving beyond gaining an understanding of public concerns to a phase in which the industry begins to devise practical and workable approaches to the problem of acceptance. The global community must formulate a basic strategy and set of tactics, then implement the strategy. It would be naïve to believe that every local situation is the same and that a "one size fits all" strategy could be devised. We can, as an integrated water reuse community, however, begin to agree on the basic elements of the strategy needed to ensure public acceptance.

This paper will focus on these needed elements, all of which deal with education, outreach, communications, and research. The following seven elements are proposed as necessary and basic components of a public acceptance strategy:

1. *Agree on Terminology;*

2. *Develop a Positive Brand;*

3. *Learn How to Communicate Risk;*

4. *Conduct the Necessary Research on Microconstituents such as Endocrine Disrupting Compound and Pharmaceutically Active Compounds;*

5. *Educate the Politicians;*

6. *Embrace all Stakeholders; and*

7. *Educate the Public on the Value of Water.*

Each of these elements is discussed in detail in the following sections.

Agree on Terminology

There is no common or agreed upon terminology in the water reuse field. In each country, and even in regions of countries, the terminology used is different. This makes it difficult to communicate a cogent, effective message to the public if the words being used are different and, in many cases, inaccurate. The use of different, inaccurate, and imprecise words results in different messages and meanings being communicated. The water reuse community has not even reconciled the most basic use of terms – and that is how to refer to the practice in which we engage. In some locales, the reclamation and reuse of water is referred to as "water recycling." In others, it is "water reuse" while in others it is "water reclamation." In the United States, this particular nomenclature stems from the language used in state and federal statutes. California's Title 22 regulations, which govern water reuse, use the term water recycling. In Florida, the common term of

usage is “reclaimed water.” A 1992 U.S. statute dealing with water reuse refers to the “reclamation of wastewater.”

The issue of terminology becomes more complicated when we refer to the origin of the water being treated. At least one water agency in the United States with a successful indirect potable reuse system tells the public that the origin of the water is “sewer water.” Other prominent practitioners in the field refer to “recycled sewage” while still others use the term “wastewater reuse.” Contrast this terminology with words found on the WateReuse Association website (e.g., “creating new sources of high quality water”) or on the Singapore PUB website (e.g., NEWater); on neither website will one find the terms “wastewater” or “sewage.”

A third dimension with respect to terminology is the organic contaminants being removed from the water and how to refer to them. In the United States, some water reuse experts are advocating the adoption of the term “microconstituents” to replace terms such as “emerging pollutants of concern,” which are said to cause unnecessary concern on the part of the public.

Even from this brief overview, it is painfully obvious that a set of common terminology is needed. Reused water is not “sewer water” or “recycled sewage;” nor is it the reuse of “wastewater.” Sewer water, from a perception or marketing perspective, connotes an extremely negative image as does recycled sewage. We in the water reuse field know better. We need to eliminate from our collective lexicons terms such as “sewage,” “drinking recycled sewage,” “wastewater reuse,” etc. We should instead focus on the highly purified status and acceptability for the water’s intended use as opposed to its history.

In almost all cases, regardless of application, the “raw material” for reused or reclaimed water is secondary effluent from wastewater treatment plants. This water has typically been treated to a high quality and usually has a biochemical oxygen demand in the 10-20 mg/l range, suspended solids in the 10-20 mg/l range, and total dissolved solids of about 1000 mg/l. This water, in most countries, has been disinfected with chlorine. Hence, it is more than 99.9% “pure.”

Water reuse practitioners then take this “raw material” and produce or “manufacture” water of a quality that matches its intended use. Treatments utilized to produce this higher quality water range from sand filtration to microfiltration to reverse osmosis and advanced oxidation processes (AOP). At facilities such as the West Basin Water Reclamation Facility in El Segundo, CA, the raw material (treated secondary effluent from the Los Angeles County Department of Water & Power) is subjected for one application to double pass reverse osmosis. This results in a water with 2.5 mg/l total dissolved solids. This highly purified “recycled water” is so “pure” at this point that fish couldn’t live in it. One could ask at what point the “wastewater” became “water.”

The WateReuse Foundation will endeavor to bring some conformity to the terminology issue by conducting a study entitled *Talking about Water: Vocabulary and Images that*

Support Informed Decisions About Water Recycling. The Foundation's Board of Directors approved partial funding for this project at its June, 2007 meeting. To ensure industry-wide acceptance, the Foundation will seek financial support from U.S. and global water associations. The objectives of the project are as follows:

1. To identify the images and words that create a public understanding of water uses and appropriate water quality using terminology that is easy to understand and explain;

2. To utilize the results of this investigation and propose to WateReuse member agencies and other stakeholders the use of appropriate common vocabulary, standardize terminology and useful images to create the greatest degree of understanding about water reuse (e.g., avoiding descriptions of recycling sewage, wastewater, effluent, treated sewage, treated effluent, or treated wastewater);

3. To develop a glossary of terms with words, definitions and old definitions (explaining why the old term is no longer conveying appropriate meaning) to reframe the way we think, report and talk about reuse; and

4. To develop informational approaches that enhance open consideration of reuse and how is it most effectively communicated (e.g., "unplanned" reuse is commonplace, discharge of recycled water to receiving waters have negative environmental impacts, etc.).

Develop a Positive Brand

There is an old axiom in politics that says a political candidate should define himself before his opponent can do it. We in the water reuse field have allowed the media and interest groups to "brand" water reuse with negative and misleading monikers such as "toilet to tap." Knowledgeable observers understand that recycled/reclaimed water (as described above) does not come from the "toilet" nor does it anywhere in the world go anywhere near the "tap." Yet the water reuse community has made few inroads into developing a positive brand. This failure has allowed newspapers, other media, and interest groups to describe our manufactured product inaccurately.

In Singapore, the Public Utilities Board branded their product "NEWater." This is a positive brand and one which should be emulated by communities throughout the world. This is admittedly difficult to do, especially when local interest groups opposed to an indirect potable reuse project, show up at public meetings and use negative, charged, and usually inaccurate terms.

Publicly traded companies all over the world spend large sums of money to create positive images and positive brands for their products. Coca-Cola is reputed to be one of the most positive and most valuable brand name products on the globe. In the past decade, Coke and Pepsi have both introduced bottled water products and have spent millions on advertising to ensure their acceptance and positive branding. Other trusted names include Johnson & Johnson (maker of Band-Aids, etc.), Sony, and Toyota. The

water reuse community needs to come together and strive to create its own positive brand which can be used consistently throughout the world.

Learn How to Communicate Risk

The water field is blessed to have prominent toxicologists and scientists who can perform risk assessment and then, based on the assessment of risks, design a risk management strategy. The third leg of this stool is "risk communication" and this important leg frequently does not receive the attention it deserves. If one believes that public acceptance is the single most important barrier to widespread water reuse, then risk communication is a tool that should be developed fully and used to impart useful information on the safety of recycled/reclaimed water to the public.

The chemical risk perceived by the public stems to a large degree from the large number of chemicals that find their way into surface and ground waters. The U.S. Environmental Protection Agency has announced its intent to "consider 87,000 [chemical] substances as potential candidates for testing" as endocrine disrupting compounds (EDCs). Most of these chemicals eventually end up in wastewater and, therefore, need to be treated, destroyed, removed, or reduced to *de minimus* risk levels. Conventional wastewater treatment will not remove all of these chemicals. However, the treatment train typically utilized in indirect potable reuse facilities, consisting of microfiltration, reverse osmosis, and advanced oxidation processes (AOP), will effectively remove the overwhelming majority of the chemicals. Top water scientists are generally in agreement that the chemicals remaining will likely be non-detectable or will be at *de minimus* risk levels. As discussed in the next section, the science needed to fully and completely demonstrate that this is indeed the case is still a work in progress, however.

There are those scientists who argue that all chemicals need to be removed or reduced to nanogram/liter or picogram/liter levels. This is virtually impossible and even unnecessary. Analytical methods often allow the detection and quantification of chemicals at levels far below known health risks. There are, however, chemicals for which analytical methods are unavailable, thereby precluding a formal assessment of risk.

This brings us to the issue at hand – communicating risk to the public and coming up with a realistic way of doing it. While no one in the scientific community would be willing to assert that there is "zero risk" from consuming recycled/reclaimed water after it has undergone extensive treatment by microfiltration, reverse osmosis, and advanced oxidation processes (i.e., UV + hydrogen peroxide), most would and could frame a convincing answer using "relative risk." This means comparing the risks of coming into contact with recycled/reclaimed water with the risks encountered in everyday life (e.g., driving an automobile, crossing a busy street, riding an elevator to the top of a tall building, being outside in a thunderstorm, etc.). The risks of coming into contact with recycled/reclaimed water compare very favorably with all of these normal everyday risks.

The water reuse community needs to be able to respond to questions from the public (including the media) with a convincing and factual message and the concept of "relative

risk" would appear to be an effective tool if developed and used properly. Earlier this year, the former General Manager of the Orange County Water District in California responded to a journalist who was questioning her about the risks of a particular chemical in recycled water by noting that "there is greater risk in getting run over by a bus in downtown Los Angeles." The bottom line is that it is incumbent upon the water reuse community to develop tools to be able to communicate effectively with the public about the risks of recycled/reclaimed water.

Conduct the Necessary Research on Microconstituents such as Endocrine Disrupting Compounds and Pharmaceutically Active Compounds

Before we will be able to discuss relative risk in an effective manner, the water reuse community must be confident that advanced water treatment processes are indeed reducing chemical risks to *de minimus* levels. Given the number of chemicals in use and their almost ubiquitous nature, substantial research is still needed on analytical methods, occurrence, exposure assessment, and removal efficiencies. The Global Water Research Coalition (GWRC) has identified research on endocrine disrupting compounds (EDCs) and pharmaceutically active compounds (PhACs) as one of its highest priorities.

Several members of the GWRC, either on their own or in collaborative efforts, are heavily engaged in research on what are sometimes referred to as "microconstituents." One of the most extensive research efforts is by the Awwa Research Foundation (AwwaRF). AwwaRF, in collaboration with regulatory agencies and other stakeholders, is leading a comprehensive research effort to better understand the occurrence, fate, human health significance, and control of endocrine disrupting compounds (EDCs) and pharmaceutical/personal care products (PPCPs) in drinking water. According to AwwaRF, this coordinated research effort will foster consensus among drinking water supply professionals and regulators on appropriate actions required to protect human health by providing the following specific outcomes:

- Development of reliable, cost-effective methods to detect and quantify PPCPs, EDCs or endocrine-disrupting activity in drinking water;
- Assessment of the occurrence of these compounds;
- Evaluation of the toxicological relevance to human health;
- Cost-effective source control and drinking water treatment alternatives; and
- Effective tools and strategies for outreach and communication with drinking water customers.

The research challenges presented by EDCs/PhACs/PPCPs in the early 21st century is similar to the ones which confronted the water industry in the late 1970s with the proliferation of occurrence in surface waters and ground waters of volatile organic chemicals, synthetic organic chemicals, and disinfection byproducts. It took the industry a full two decades to determine occurrence, exposure, and risk, set standards at levels protective of public health, and develop technologies to destroy or remove these chemicals. Hopefully, the current challenge will not require as long a period of time to

develop a complete understanding and to devise strategies for controlling these microconstituents.

Educate the Politicians

Political support is crucial to the success of a water reuse project. Experience has shown over the past 10 years that if local officials are not firmly committed, the project will likely not be able to withstand public scrutiny. Although the reasons for success or failure of a project typically involve numerous factors as documented by Ruetten (2004), the support of local elected officials is an especially important issue. Communities have rejected several proposed projects involving indirect potable reuse over the past decade. These include Tampa Bay (Florida, USA), San Diego (California, USA), East Valley (California, USA), Dublin San Ramon (California, USA), and Toowoomba (Queensland, Australia). In at least four of the five cases, lack of political support by local elected officials was a crucial factor.

The lesson for water agency managers is clear. When contemplating a reuse project that might prove to be controversial, engage local political leaders early and garner their support – recognizing, however, that this support might erode if and when the project makes the headlines of the local paper.

Embrace all Stakeholders

Virtually all the researchers who specialize in public perception would agree wholeheartedly that early involvement and continued involvement of all stakeholder groups is essential to the success of a reuse project. Only a handful of community activists can defeat a project; thus, it is essential that all stakeholders be identified and included early in the conceptual stages of a project. As documented by Hartley (2003) and other researchers, stakeholder involvement and public participation can yield numerous benefits, especially the establishment of public confidence and trust.

Educate the Public on the Value of Water

If one examines the basic needs of humankind over the past 2000 years, one can discover that it is possible to exist and even prosper without oil, automobiles, telephones, television, personal computers, the internet, and other modern conveniences. Humankind has never been able to live without water, however, and will not be able to in the future. With the population of the earth projected to increase to nine billion by the year 2050, water for drinking, for use by agriculture and by industry, will become increasingly scarce and increasingly valuable. Many experts have predicted a global water crisis by the year 2020 or 2025.

The water industry has done a poor job of educating the public on the value of water. One of the reasons is that, in many locales, the price of water has been subsidized, either directly or through poor pricing, and thus has not reflected the total cost of producing and

distributing the water. Only now, in the first decade of the 21st century, have water utilities begun to practice full cost pricing.

The public, in most countries, do not believe that water is a commodity like oil or soybeans or copper. Instead, they believe it is a public good that must be furnished to the entire populace and at subsidized rates if necessary.

With nine billion people on the globe, it will become necessary to tap "alternative water sources," including and especially recycled/reclaimed water and saline water (i.e., seawater and brackish groundwater). Just as is the case with oil and alternative sources of energy, unless the price of water rises, it will not be economically feasible to develop alternative sources of water. This can happen only if: 1) the public is convinced of the value of water; and 2) the "commodity" is priced at the full cost of production, distribution, and infrastructure replacement.

The American politician and philosopher Ben Franklin perhaps stated it best when he said "You know the value of water when the well is dry." Hopefully the water industry will begin to do a better job of educating the public on the value of water and that adequate alternative sources of supply will be developed before the well runs dry.

SUMMARY AND CONCLUSIONS

The objective of this paper was not to present a panacea – for one does not exist. The objective was rather to issue a "call to arms" to the global water reuse community to band together and embark on the development of a strategy to achieve widespread public acceptance of water reuse.

If the water reuse community could agree upon the seven basic elements described herein, then begin to formulate a strategy around them, we would indeed be rendering a valuable service to society.

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