Consumer Behaviors and Trends Surrounding the Use and Impact of Chloride-Based Water Softeners

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August 15, 2003

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Executive Summary

The main goal of this project was to access consumer behavior towards different types of incentive programs that will help mitigate salinity issues that are caused by the use of water softeners in residential households. The magnitude and scope of the problem and the costs and benefits of alternative programs were investigated. A pilot project that provided detailed consumer reaction and behavior towards certain specific incentives was implemented. Analyses were performed so as to provide critical and pertinent information regarding the likelihood of success and potential impediments to any future full-scale rollouts of well-tuned incentive programs. The households within the service area of the Irvine Ranch Water District (IRWD) were used as the targeted market for this pilot project. In addition, significant support and advice were provided by five agencies: Inland Empire Utilities Agency, Los Angeles Sanitation District, Orange County Sanitation District, National Water Research Institute, and the Irvine Ranch Water District. Without the guidance and leadership of these organizations, this project would not have been possible.

A four-dimensional data-development model was designed to accomplish the aforementioned goals. The four data-capturing dimensions were:

- Focus group sessions – this captured information developed from the two focus group sessions involving 62 participants from the customer base of the IRWD.
- Focus group questionnaire analysis – this experiment obtained a series of responses from the 62 focus group participants and provided evaluation of long-term changes in consumer behavior.
- General survey – this captured the results from a survey of 876 households from the target population.
- Incentive program – this experiment acquired the differences between potential and actual participants in a pilot incentive plan to eliminate chloride-based water softeners.

The following are the key observations developed and concluded from this project:

- How households responded to hypothetical decisions concerning the use and possible regulation of water softeners was significantly different to what they would actually be willing to do when given the opportunity and incentive to change.

- Households' choice and use of chloride-based water softeners at numerous times were based on misinformation and applied for the wrong purpose, suggesting that consumer education provided by the local water agencies would be effective and important.

- Households that did not operate a water softener believed that solutions should be mandated through some form of regulation in order to solve the problems with water quality.

- Financial incentives were critical and must be provided at significant levels—at or near full replacement cost. Consumers in general were not willing to do what was best for the community on a voluntary basis. Those that participated in the incentive program were doing so because of personal gain, (i.e., it was time to change to a new system or the potential benefits of a new system were worth the incentive).

- Consumers do trust local water agencies as a provider of information and initiator of efforts that could help solve the problems.

- Local water agencies should take on a proactive and integrative leadership role that would actively educate the public on all water-related issues.

- It is beneficial to consider providing funding to private water softener manufacturers and service providers for research and development on alternative water conditioning technology that would be more environmentally friendly and an acceptable alternative to consumers.

The project team's main recommendation is for regional water agencies to provide educational information continuously and initiate an aggressive incentive program that will engage consumers over a period of time in order to impel a change of behavior regarding the necessity of maintaining chloride-based water softeners. Further research will be necessary to establish the parameters of potential programs that could be offered to consumers as well as suitable formats.

1. Design of experiment

In order to capture the likely reactions/responses from households regarding chloride-based water softeners, multiple sources of potential data were built into the design of this project. Four experiments, each with different objectives and emphases that allowed us to secure information from multiple dimensions, were designed. It was deemed necessary to investigate household responses from a broad-based, general point of view as well as from a more in-depth reference point. In addition, measuring consumer opinions over a period of time would also allow the analysis of effects of various factors, such as the introduction of accurate factual information to participants.

As a result a total of four data-capturing dimensions were developed as followed:

Focus Group Sessions --Focus group sessions are qualitative in nature. They are unstructured in order to bring out the emotions, needs, motives, attitudes, and values of the consumers towards various issues. A limited number of households were invited to participate in one of the two sessions that were developed. The purpose was to obtain opinions on various aspects regarding an incentive program for the change-out of chloride-based water softeners in households. Effective motivation tactics that would deter households from the future purchase of such units would also be examined.

Focus Group Sessions Questionnaires – Each of the households that participated in the sessions would be required to respond to a series of questionnaires that would further secure their opinions on various issues. Focus group questionnaires were in the form of short essays. These questions would provoke new ideas that were not previously observed or identified in earlier experiments. The evaluation by questionnaires would occur over a period of approximately four weeks. The final data-capturing instrument would be a follow-up telephone call to each participant.

General Survey --General survey design was based substantially on the results and observations from focus group sessions. It produced more comprehensive information than the focus group questionnaires, including general demographic information, and also

specific information pertaining to water treatment options and issues regarding water softeners. This broad-based general survey would be used to analyze the root cause of the purchase of chloride-based water softeners and acceptable alternatives for removal of existing units in households.

Incentive Program – a pilot incentive program would be offered to selective households and the responses and rationale of their subsequent actions would be recorded. This would then be compared with the hypothetical responses provided by households in the other experiments—determining what actual actions would take place once cash incentives were offered.

With the data collected from the four dimensions above, aggregated effects and analysis would then be performed in order to obtain a better understanding of the opinions and behaviors of consumers towards chloride-based water softeners. Ultimately the use of these experiments was accomplished not only to obtain and analyze information, but also to develop research mechanics and a methodology for future research.

2. Focus group sessions

As part of this study it was determined at the beginning of our research that the use of a select number of focus groups would enhance the initial decision to work extensively with a field questionnaire as a primary direction for our work. The ability to study a select group of consumers over a measured period of time allowed us to better assess the effects of education and information dissemination on our test groups.

2.1 Objectives

Our reasons for utilizing focus groups at the outset of our fieldwork were to accomplish some key objectives early on in our efforts:

- Establish a "base point" of consumer opinion and thought from which to measure changes during the assignment;
- Determine how much accurate information regarding the effects of water softeners participants already had at their disposal;
- Evaluate how water softener users and non-users viewed their individual and collective contributions to the problems with chlorides in the waste water process;
- Develop some preliminary guidelines and estimates as to types and size of inducements for a subsequent incentive program to be offered to focus group attendees as well as a select group of additional water district customers targeted with the field (general) questionnaire.

2.2 Methodology

Given specific time and budgetary constraints for the utilization of incentive funds from the California State Department of Water Resources, we decided to establish two focus group sessions to be conducted on a Saturday (one A.M. and one P.M. session). Since

the Irvine Ranch Water District had volunteered to provide us with limited access to their customer database and the use of their headquarters facility to host such an event, they were chosen as our target district/population.

We enlisted participants for the focus groups through telephone solicitation and a mailing of 2000 "invitations" to water district customers in early May 2003 (Appendix B, page B-2). A stipend of $150 per household was offered for attendance, participation in the session, and subsequent completion of a detailed questionnaire and follow-up telephone Q&A session. A website and telephone callback site were created to handle inquiries and RSVP's. This effort resulted in over 70 households reserving spaces for the two sessions that were scheduled for May 31, 2003 at the IRWD offices.

Participants were categorized by whether or not they owned and/or operated a water-softening device in their home and both focus groups included nearly equal numbers of both populations in their make-up. A total of 62 households participated in the focus groups. The number of participants who have or do not have water softeners in the A.M. and P.M. sessions is summarized in Table 1 below:

Table 1: Number of participants with or without water softener

	# w/o water softener	# w/ water softener	Total
AM session	12	16	28
PM session	15	19	34
Total	27	35	62

Sessions ran for two hours each, were conducted by David Kung and Kim Knight and included four additional staff observers who recorded comments and physical observations of the groups (See Appendix E for copies of the observation reports). In addition to the observers, an audiotape of the two groups, including observer debriefing sessions for each group, was produced.

Prior to the beginning of each session, participants were asked to provide contact information and sign in. See Appendix D (Page D-2) for a copy of the general

information sheet. Once registered, each household was requested to complete a brief questionnaire that would assist in establishing the group's "base point" for the purpose of tracking progress during the observation period. See Appendix D (Page D-3) for a copy of the initial questionnaire.

The focus group presentation commenced (after the completion of the "base" questionnaire) with the introduction of general information about the status of water quality in southern California, Orange County in particular. Specific information regarding rising salinity and chloride levels in waste water targeted for reclamation, and the inherent dangers that these increasing levels posed, were introduced to the groups and responses were noted. Participants were allowed to comment freely on the information and others' reactions to it. No effort was made to direct the participants' observations or opinions towards a specific plan of action initially. After opportunity was given for all interested parties to comment on the "problem" of rising chloride and salinity levels, the concept of trying to define some sort of mutually acceptable course of action was introduced. Alternative solutions were encouraged from the attendees and discussed openly in the forum. Participants were allowed to comment/criticize proposals and offer those of their own for the group's consideration. After a significant period of time had elapsed, the facilitator asked the group to summarize their thoughts and recommendations. Finally a second brief questionnaire was presented to the group and they were asked to either complete it there or finish it at home and return it via the mail (Appendix G, pages D-4 and D-5). Questionnaire 2A was for participants who have water softeners and Questionnaire 2B was for participants who do not operate a water softener.

Participants were reminded of their obligation to complete a more comprehensive questionnaire that would be mailed to them during the following week and to investigate carefully the incentive program that would be included in with the questionnaire and consider signing up for one of the options available to them. Within one week of the sessions a four-page questionnaire and incentive program information sheet was mailed to each of the participants for their feedback and evaluation (Appendix F). Additionally a

follow-up telephone survey a few weeks after the focus group sessions was also required as part of the focus group program.

2.3 Summary of results

Four general observations resulted in the administration of the two focus groups:

- There is a significant amount of misinformation or lack of accurate and factual information available to consumers regarding the problem of salinity and chlorides in their water, the causes and sources of these and other pollutants, their possible solutions and the benefits and the drawbacks of each.

- Participants in the focus groups who did not own/operate a water-softening device appeared quite keen on "regulating" a change-out of chloride-based softeners in order to significantly reduce the amount of chlorides in waste water and bring water softener owners into compliance.

- Participants who did operate salt-based water softeners were willing to consider removing or changing their present systems with appropriate justifications and/or adequate incentives to do so.

- Water and sanitation districts were trusted by participants as disseminators of accurate information regarding water quality issues.

Early on in both focus group sessions it was discovered that many, if not most, of the attendees were significantly uninformed about the current status of water quality issues—whether they related to drinking water sources and quality, purification processes undertaken by their local water utility, regulation of contaminant levels of waste water treatment, or recycling requirements and programs undertaken by their water or sanitation utility. This was particularly true concerning the impact of salt-based water-softening devices and the resulting impact their continued use has on utilities to treat chloride presence in waste water.

In addition to this lack of information about the effects of water softeners, the water softener industry has been less than factual in portraying their products and services to the public as well. A number of comments from portable exchange service customers and consumers who bought softeners from major water softening equipment vendors (such as Culligan and Rayne) centered around claims made by these providers that better water purity and quality improvement would be accomplished solely by the introduction of a water softener into their household.

This combination of being uninformed, and in some cases misinformed, caused a measurable amount of concern on the part of the participants. Water softener users were quick to point out that they were unaware of the effects that their appliance was causing on the environment. Some went so far as to propose quick personal action on their own part to remedy the situation, although most were reluctant to make immediate changes in their use of softeners until they had more information available to them. Those without water softeners, while somewhat sympathetic to their counterparts' predicament, in general felt somewhat justified in not being personally responsible for adding chlorides into the wastewater.

Focus group participants without softeners were vocal in their desire to see that those with softeners took some responsible action to reduce chloride levels. Their emphasis was placed on "regulating" some sort of change-out of the offending systems. This could take the form of (1) complete removal of the appliance, (2) the change from an older unit to a newer, high-efficiency softener, or (3) replacement of an existing unit serviced in the home to a portable exchange service. Additionally, non-softener homeowners were willing to seriously consider some sort of district-wide assessment or contribution to an incentive pool in order to get the units removed from the water district.

3. Focus Group Questionnaires Analysis

3.1 Objectives

The objectives of this particular experiment were to design and develop a comprehensive array of questionnaires that would effectively analyze consumer opinions at key junctures (at the outset of the focus group presentations and at the close of the focus group presentations). Since there were multiple data collection instruments and benchmarks utilized in this section over a specific period of time and the introduction of certain data, the change in participant opinions could be examined with the data collected here that other experiments could not provide.

3.2 Methodology

The main focus of this effort was to capture data over a fixed period of time so as to observe opinions expressed by consumers regarding financial or other types of incentives in addressing water salinity issues caused by household chloride-based water softeners, and note any changes due to the introduction of factual information concerning their use.

A total of five data collection instruments were developed for this dimension. The first instrument was a general questionnaire that captured the demographic information for each participant in the two focus groups. (Please see Appendix D, page D-2 for a copy of this questionnaire.) This particular instrument was administered as each participant arrived for their session and was completed prior to the commencement of the sessions.

The second instrument was a questionnaire that inquired about the participants' opinions concerning water quality and potential consideration and/or purchase of a water-softening appliance. In addition it addressed their awareness of problems that were caused by chloride-based water softeners (Appendix D, page D-3). This was administered immediately at the beginning of the session and was given without comment as to its purpose or the purpose of the session.

The third instrument was a questionnaire given at the end of the focus group session that included queries concerning the participants' knowledge about whether chloride-based water softeners caused problems with waste water in their community (Appendix D, pages D-4, D-5). This was substantially a repetition of material originally presented in the second questionnaire. This was to be utilized to examine the effectiveness of factual information in its ability to significantly change or modify consumer opinions in the short-term. Additional questions in this questionnaire asked what would be the participants' choice if they were to consider the purchase of a water treatment, now armed with new factual information. Would they buy a new unit or not, or if they currently owned a softener what would be a sufficient inducement for them to change it out to another type of water treatment system. An additional question was specifically added to inquire about the usefulness of the information they received during the session.

The fourth instrument was a series of questions developed for a general survey (Appendix F, page F-4) administered to a large number of households. The participants of the focus group were included in this questionnaire mailing so as to re-confirm the opinions they expressed in their respective sessions.

The fifth instrument developed was an in-person follow-up telephone interview to each focus group participant (Please see Section 6 for a detailed analysis). The intention of this vehicle was to investigate in greater detail the rationale of participants' behavior throughout the entire program, particularly including the introduction of specific cash incentives for water softener users to modify their behavior. This vehicle would capture the true behavior of consumers as compared to their expressed opinions throughout the course of the study.

With the above-mentioned data collection instruments, analyses would be developed by tracking the behavior of each participant over a period of approximately four weeks.

3.3 Summary of results

A total of 62 participants in the two focus group sessions contributed questionnaires, 29 of the participants that had existing water softeners responded completely throughout the

five data collection instruments. Of the 29, two participants already were using non-chloride based units. Two other participants stated they would not change and give up their chloride-based water softeners. Of the remaining 25, all participants expressed a willingness to consider changing out their existing softeners, while 18 of the 25 believed that they should be provided with some form of incentive/assistance for their voluntary actions. The range of incentives varied from 10% to 100% of the cost of the appliance. A majority of the responses were for incentives of more than 50% of the total cost, or over $600 on average. There was no specific direction regarding a recommendation for an incentive level if softener owners were to switch to a portable exchange service.

Focus group participants persuasively articulated that their opinions on chloride-based water softeners had changed after being informed of the issues surrounding their continued use and the effects towards which their appliances would continue to contribute. It was clear that participants would evaluate alternatives, but it was equally unclear as to whether or not they would participate in any change-out program until specific alternatives were presented to them for evaluation and potential action.

4. General Survey

4.1 Objective

The traditional vehicle utilized in many market research studies such as this one is the comprehensive questionnaire that assesses consumer opinions at a specific point in time with a fixed base of respondents. Our objective was to conduct a general survey in order to confirm consumer opinions and behaviors regarding water treatment and use of water softeners in a larger population than the group tested in the focus group meetings. The survey was developed to provide a number of focus points from which to evaluate the strength of opinion on the part of focus group participants and general population trends as points of comparison.

4.2 Methodology

At the beginning of June 2003, a list of 3,930 residents were randomly selected from Irvine Ranch Water District account holders and subsequently mailed a copy of our general questionnaire (Appendix F, page F-4), along with information concerning an incentive program in which they were invited to participate (Appendix F, page F-2). Sixty-two additional questionnaires and incentive program information sheets were mailed out to the participants of the focus group meetings. Attached to the questionnaire was a brief letter providing information about the effects of water softeners on wastewater, including Internet links to informative web sites about issues concerning water-softening devices. The letter also invited the addressees to complete the questionnaire and take advantage of an incentive program that was provided for their benefit.

The questionnaire contained 3 sections:

- The first section requested general demographic information, which was then compiled to capture information about consumers' income, education and general opinion about water quality issues.

- The second portion focused on residents who operated chloride-based water softeners. Questions were centered in this section investigated the importance attributed to the operation of a softener in the home and whether or not households would be willing to consider a change-out of the unit.

- The third section examined residents who operated non-chloride-based water softeners or who did not have water softeners. The questionnaire focused on whether households intended to purchase a water treatment system and, if so, what type of water softener they were inclined to purchase after being informed about the problems caused by chloride-based water softeners. Additionally, we queried participants as to whether they support financial incentives to remove chloride-based water softeners.

We also included questions that examined the issue of voluntary versus involuntary removal of targeted softeners and how households felt about incentive versus regulatory responses to the problem.

A database was created from the over 800 returned questionnaires to document all of the information obtained. Statistical analyses, plots, and cross-tabulations were developed and evaluated to compare the consumer behaviors that evolved from the research received.

4.3 Summary of results

As of the date on this report, 876 questionnaires have been completed and returned. Adjusted to exclude incorrect addresses and returned items, our response rate was 22%.

Some basic statistical data gleaned from the questionnaires:

Table 2: What types of water softener do people use?

Types of water softener	Counts	Percentage
Chloride-based water softener	35	4%
Portable exchange service	54	6%
Other water softener	28	3%
None	759	87%
Total	876	100%

Table 3: Intention to buy water softeners

Intention to buy water softeners	Counts	Percentage
Yes	29	4%
No	631	76%
Don't know	168	20%
Total	828	100%

Results from some of our analyses are summarized below:

Result 1: A significant number of respondents have major misconceptions about the function of water softeners. Table 4 summarizes the answers to the question, "Why do you use a water softener?" from households who operate chloride-based water softeners.

Table 4: Reasons for people to have a water softener at home

(Total count: 35)

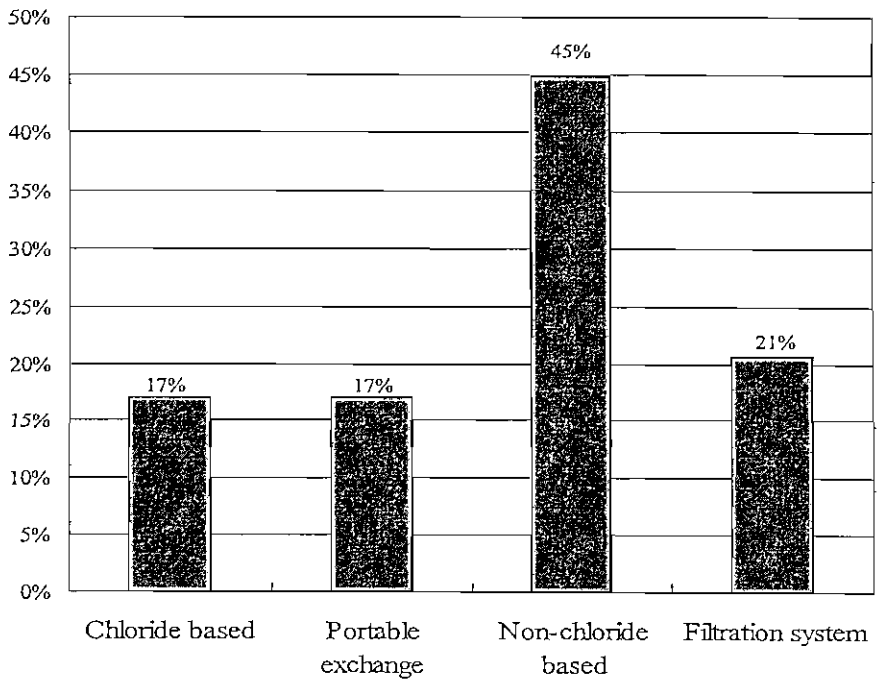
Reasons to use a water softener	Counts	% of Households
To reduce the hardness	30	86%
To improve appearance, taste and smell	16	46%
To remove contaminants that may endanger health	14	40%
Other	3	9%

Although the sole function of a chloride-based water softener is to remove magnesium and calcium from water, 40% of the households that operated chloride-based units believed that they could remove contaminants that might endanger their health, and 46% of the households responding believed that water softeners could improve water appearance, taste and smell. This data paralleled results we developed from the focus group data and appeared to solidify our original proposition that a sizeable number of participants in our survey and focus groups were ignorant of what a water softener's true capabilities are and what consumers could and could not expect from their operation.

Result 2: Consumers are willing to seriously consider and likely purchase non-chloride based water softeners after being informed of the problems caused by traditional units. See Graph 1 below:

Graph 1: Types of water softeners which respondents intend to buy after being informed of the damages of chloride-based water softeners

(Total count: 29)



After obtaining information concerning water softener issues, of the households responding that intended to buy a system 45% stated a preference towards non-chloride-based water softeners; 17% of respondents chose chloride-based water softeners.

Respondents' rationale for their choice of which type of water softener they would choose (as indicated in Graph 1 above) is summarized in Table 5 below:

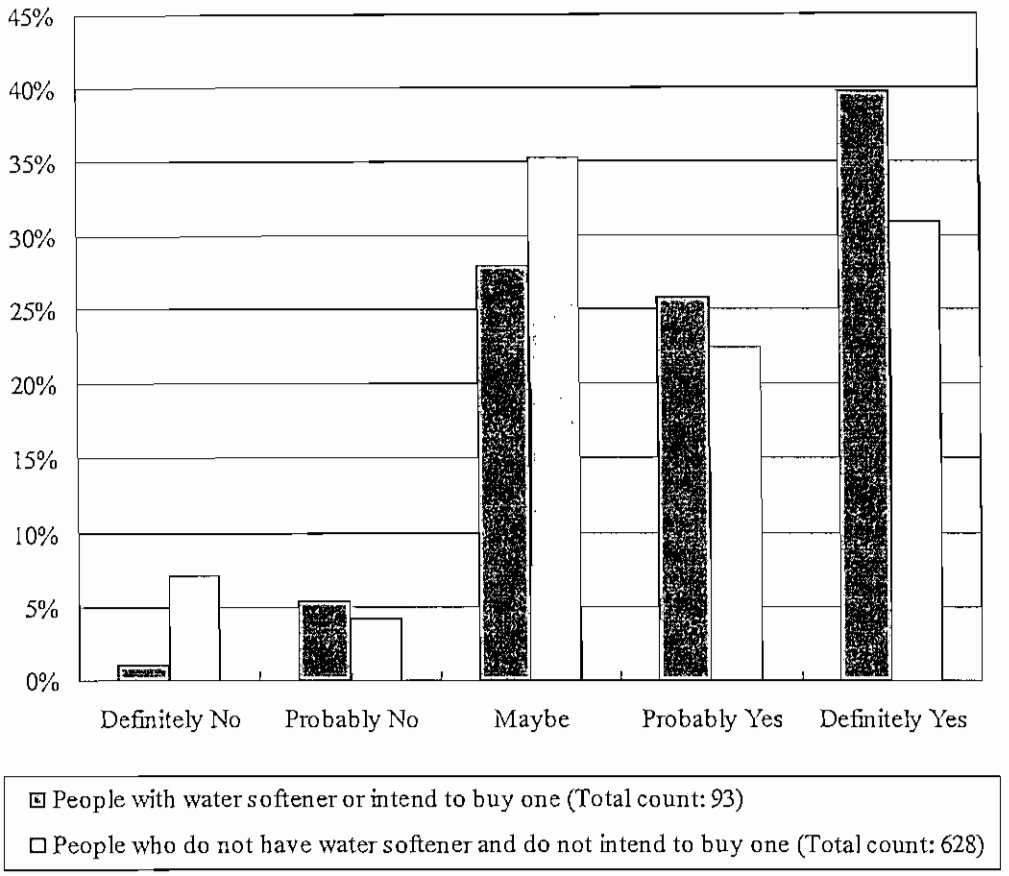
Table 5: Respondent's rationale for their choice of which type of water softener to choose (if they intended to purchase one)

Type intend to buy	Less environmental damage		Avoid water shortage		Reduce more hardness		Less expensive		Total checkmarks	
Chloride based system	3	14%	1	5%	10	45%	8	36%	22	100%
Portable exchange service	10	36%	0	0%	10	36%	8	29%	28	100%
Non-chloride based system	86	64%	10	7%	26	19%	13	10%	135	100%
Other water filtration system	18	53%	1	3%	4	12%	11	32%	34	100%

The main reason stated for the purchase of a non-chloride based system was that these systems cause less environmental damage. For respondents who intended to purchase a chloride-based water softener, the majority stated they were primarily concerned about reducing water hardness. The results would suggest that consumers are still likely to purchase a chloride-based water softener, if reducing water hardness is their primary goal, even if they are aware of the environmental damages caused by them.

Result 3: Consumers on both sides of the water softener issue would appear willing to actively support the effort to remove chloride-based water softeners. The results from the completed questionnaires are summarized in Graph 2 below:

Graph 2: Whether people want to support the effort to remove chloride-based water softener



Results were plotted from two categories: (1) households who have water softeners or intend to buy one, and (2) households who do not have water softeners and do not intend to buy one. For households who do not have water softeners and do not intend to buy one, we investigated whether they were willing to use personal assessment money to solve the problems caused by chloride-based water softeners. The results show that a majority of households, regardless of whether softeners were operating in the home, appeared willing to support the effort to remove chloride-based water softeners in existing households.

Result 4: If forced to remove their current chloride-based water softeners, a majority of households chose to replace with non-chloride-based water softeners.

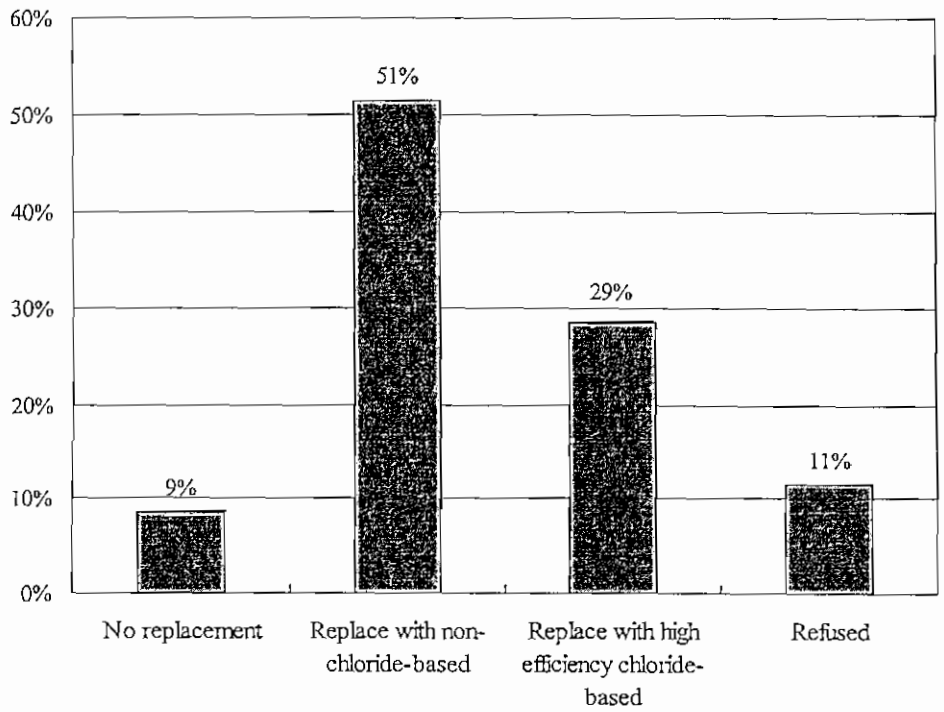
The question was posed: "If, due to government regulations, you were required to remove your current chloride (salt)-based water softener from your home, which option would you choose?" The 3 options offered were:

- Option 1: Remove your water softener with no replacement.
- Option 2: Remove your water softener and replace it with a non-chloride-based water softener, which costs approximately $1,500.
- Option 3: Remove your water softener and upgrade to a new high-efficiency, chloride-based water softener, which costs approximately $1,200.

The results from the completed questionnaires are plotted in Graph 3 below:

Graph 3: Options chosen if forced to remove chloride-based water softener

(Total count: 35)



51% of households who have chloride-based water softeners chose to replace them with non-chloride-based water softeners. The remaining 29% of households who still preferred chloride-based water softeners chose high-efficiency models, which would lead to lower levels of salt usage. Respondent's rationale for their choice of options is summarized in Table 6 below:

Table 6: Respondents' rationale for their choice of options if forced to remove chloride-based water softeners

Options	Less environmental damage		Avoid water shortage		Maintain full water softness		Less expensive		Total checkmarks	
No replacement	2	100%	0	0%	0	0%	0	0%	2	100%
Replace with non-chloride unit	15	68%	0	0%	7	32%	0	0%	22	100%
Replace with high efficiency chloride unit	1	13%	0	0%	7	87%	0	0%	8	100%

Most people chose "no replacement" or "replace with non-chloride-based system" because they believed their actions would not be as harmful to the environment. A significant majority of people who chose to replace existing units with a high-efficiency, chloride-based system chose this option because they wanted to maintain a full water softness level for their households.

Result 5: A significant portion of households who operate chloride-based water softeners believe that it is important for them to have a water softening system in the home. See Table 7 below:

Table 7: How important is it to have a water softener at home?

How important	Counts	Percentage
Not at all important	2	6%
Not so important	2	6%
Somewhat important	7	20%
Important	6	17%
Very important	18	51%
Total	35	100%

68% of residents who have chloride-based water softeners believe it is significantly important to have a water softening system in their homes. Only 12% who operate a water softener believe that its inclusion in the home is not important.

Result 6: The age of water softeners does not have an impact on consumers' decisions concerning whether or not they would consider converting to a non-chloride-based system. If forced or "regulated" to remove their chloride-based water softeners, the age of the appliance would have little effect on the decisions concerning viable options from which to choose.

Information concerning the age of current chloride-based water softeners from the respondents is summarized in the table below:

Table 8: Age of chloride-based water softeners

Age of water softener	Count	Percentage
Less than 4 years old	26	74%
4-7 years old	6	17%
8 years old or more	2	6%
Don't know	1	3%
Total	35	100%

Examining the results, we found most of the units reported in this survey question were less than 4 years old. We then combined results into 2 groups: "less than 4 years old" and

"more than 4 years old" ("Don't know" was considered as an "error" response). The hypothesis was that residents having newer water softeners are less willing to remove them than residents who have older units. Statistical tests were conducted to see whether the age of a water softener had an effect on consumers' decisions. Detailed statistical analysis of the results is found in Appendix A-1, page A-2. The data shows that the age of the water softener does not have an effect on participant's decision about whether they would consider converting to a non-chloride-based system voluntarily. If forced to remove their current chloride-based water softeners and given three options to consider—(1) no replacement, (2) replace with non-chloride-based water softener, or (3) replace with a high-efficiency, chloride-based water softener—the consumers' decision would not be affected by the age of their chloride-based water softener. Similar statistical analysis was conducted as in the above example and can be found in Appendix A-2, page A-3.

Result 7: Whether people "inherited" an existing system at the time of home purchase or occupancy, or added the unit later does not have an effect on consumers' decision concerning whether they would consider converting to a non-chloride-based system, nor does it have an effect on people's decision surrounding which options to choose if forced or "regulated" to remove a chloride-based water softener.

The statistics from the returned questionnaires are summarized in Table 9 below:

Table 9: Time of installation of chloride-based water softeners

Time of installation	Counts	Percentage
In home at purchase	6	17%
Added at time of move-in	13	37%
Added later	14	40%
Don't know	2	6%
Total	35	100%

According to the results from returned questionnaires, we categorized responses as "Part of home purchase" and "Added separately." The two households responding "Don't know" were deducted from the analysis as "errors." Statistical tests were conducted to determine whether time of installation had an effect on respondents' decisions. The resulting detailed statistical analyses are found in Appendices A-3 and A-4.

The results show that time of installation does not have impact on consumers' decision about whether they would consider converting to a non-chloride-based system voluntarily, and it also does not affect the conversion decision, if households were forced to remove their system, regarding which option they chose (no replacement, replace with non-chloride-based water softener, or replace with high efficiency chloride-based water softener).

The results show that time of installation of water softener will not affect people's decision whether they remove the system voluntarily or if they are coerced.

Result 8: For households who do not own a chloride-based water softener, household income does not affect their decision regarding whether or not to support financial incentives to remove chloride-based water softeners. For households that have chloride-based water softeners, household income does not affect their decisions about whether to consider converting to non-chloride based water softeners voluntarily. It also does not affect homeowners' decision about which options to choose if forced to remove chloride-based water softeners.

Income distribution from the survey is in Table 10 below:

Table 10: Income distribution

(Total count: 818)

Total annual household income	Percentage
Under $35,000	4%
$35,000-$65,000	17%
$65,000-$100,000	29%
$100,000-$150,000	28%
Over $150,000	22%
Total	100%

We combined data into 4 groups: "Under $65,000", "$65,000-100,000", "100,000-150,000" and "Over 150,000" for purposes of our statistical analyses.

Part of this statistical test was done on a population that does not have chloride-based water softeners (Appendix A-5). The results show that income level does not have a significant effect on the consumer's decision concerning whether to support financial incentives to remove chloride-based water softeners.

A similar statistical test was performed as outlined above for consumers who do have chloride-based water softeners (Appendix A-6). The data show that income level does play an important role on consumers' decision to consider converting to non-chloride-based water softeners voluntarily. Additionally, it also does not have a significant effect on consumers' decision on which options to choose (no replacement, replace with non-chloride-based water softener, or replace with high efficiency chloride-based water softener) if forced to remove chloride-based water softener (Appendix A-7).

5. Incentive program

5.1 Objective

The main objective of the incentive program was to field-test the list of incentives developed from our preliminary research and the results of our observations from the focus group experiments. From these sources we captured information on consumer perceptions and their stated intentions concerning the operation of chloride-based water softeners in their homes and/or their community. The incentive program devised was conducted to test the consumer's actual behavior when faced with specific incentives designed to impel a specific commitment out of them. In short, we wanted to discover if respondents would actually follow through with their verbal or written commitments made during the evaluation process.

5.2 Methodology

Three incentive options were offered to the nearly 4,000 households who received our questionnaire though the mail. A separate sheet outlining the program with the incentives and how to apply for them was included in the mailing (Appendix F, page F-2). The options were:

- **Option One** -- Remove the currently operating chloride (salt)-based water softener from their primary residence and sign a written agreement, as the owner of the unit, not to acquire a new chloride-based water softener within three years of removal. Upon submission of proof of removal, a one-time cash stipend of $600 would be awarded. One proof of purchase (dated between January 1 and June 1, 2003) of water softener salt or potassium chloride was considered sufficient proof of "currently operating" for purposes of this incentive. This agreement did not preclude the subsequent purchase of a non-chloride-based water softener (e.g., electro-static technology) or subscribing to a portable exchange service. Proof of removal was subject to audit by the local water or sanitation agency.

- **Option Two** – Removal of the chloride (salt)-based water softener from your primary household and an upgrade to a new high efficiency chloride-based water softener of similar capacity, participants would receive a one-time cash stipend of $250. Proof of removal of the old unit and the subsequent upgrade from a vendor/ supplier was required.

- **Option Three** – Purchase of a new non-chloride-based water softener (e.g., electro-static technology). Upon verified proof of purchase, participants would receive a one-time cash stipend of $300.

Options 1 and 2 were for questionnaire recipients who already operated chloride-based water softeners. Option 3 could be used by participants who did not own a water softener but did intend to buy a non-chloride based system.

The 876 responses received from the general survey were considered as "the population" for the incentive program analysis. From the returned questionnaires, it could be determined how many households were qualified for the incentive program. Calculations were made to determine potential participants. These results were considered as "Hypothetical Results" in the following analysis. After participants responded to the incentive program, we were able to find out how many households actually participated in the incentive program. These results were considered as "Actual Results" in the following analysis. By comparing and analyzing hypothetical behaviors with actual behaviors, we believed we could discover whether these incentives would work effectively in a "rebate program" and whether participants' behavior was consistent with what they had stated were their intentions.

5.3 Summary of results

From the 876 responses of the general survey, 35 households own a chloride-based water softener, 29 households intend to buy a water treatment system, as shown in Table 11 below. These households were considered the potential participants in the incentive program.

Table 11: Potential participants in the incentive program

(from results of the general survey)

	Counts
# of households w/ chloride-based water softener	35
# of households intending to buy a system	29
Total	64

As summarized in Table 12 below, three households chose option 1, two chose option 2, and six chose option 3:

Table 12: Incentive program participants

	Counts
# of households choosing Option 1	3
# of households choosing Option 2	2
# of households choosing Option 3	6
Total	11

The following is our analysis of the "Hypothetical Results" utilizing the incentive options.

Option 1 was developed for households who operated chloride-based water softeners. The primary incentive for those in this category was the removal or replacement of their current appliance. From the results of the general survey, 14 households were willing to consider voluntarily converting to a non-chloride-based system and 22 households were willing to choose no replacement or to replace their unit with a non-chloride-based system if forced to remove it. Therefore, our hypothesis was that households who make the above decisions should choose option 1. From the general survey results, there are 22 households that fit this criterion. Therefore 22 would be the "Hypothetical Result" for option 1.

Option 2 was designed for households who operated chloride-based water softeners. This population chose to remove current chloride-based water softeners and replace them with high-efficiency models. Our hypothetical results were derived from the general survey where households chose to replace existing units with a high-efficiency model if forced to remove their current unit. The results show there were 9 households wanting to replace with a high-efficiency model. Therefore, the "Hypothetical Result" for option 2 is 9.

Option 3 was developed for households that did not have a water softener and intended to purchase a non-chloride-based system. From the general survey there were 13 households that indicated an intention to buy a non-chloride-based water softener. Therefore, we hypothesize that there should be 13 households choosing option 3.

Table 13 below summarizes the comparison of hypothetical and actual results:

Table 13: Comparison of hypothetical and actual results

	Hypothesis		Actual	
	Count	% (base)	Count	% (base)
Option 1 (replace with non-chloride-based system)	22	63% (35)	3	9% (35)
Option 2 (replace with high efficiency model)	9	26% (35)	2	6% (35)
Option 3 (buy a non-chloride-based system)	13	45% (29)	6	21% (29)

One of the reasons for the significant disparity between the hypothetical and actual results (44 responses intending some sort of action and only 11 households actively participating in the incentive program) lies in the restrictive time frame between the announcement of the incentive program and the consumers' deadline for participation. The incentive program required households to evaluate the three options, research and analyze the cost/benefit parameters, find vendors and determine best pricing and record their intention to participate within 3 weeks. While in the general survey the decision surrounding the question, "whether [consumers] intend to buy a water softener," was based on a consideration time of twelve months. The tight time parameters we defined for the incentive program could have made it difficult for households to make this decision in such a short time. Unfortunately our organization was under tight time

considerations to execute the incentive program and report results in order to adequately fund the incentives.

Much work needs to be accomplished in this arena in the future to more significantly determine whether the options proposed or the size of the incentives offered were appropriate and adequate to effectively incentivize the participants of future programs. Preliminary results and observations would lend credence to the conclusion that consumers are very reluctant to make such significant changes in their household operations, even in the face of mounting evidence that their behavior might be harmful to the environment, unless significantly compensated for doing so.

6. Follow-up Telephone Survey to Focus Group Participants

6.1 Objectives

The intent of this section was to track and explain the behavior and preferences of focus group participants through the use of a follow-up telephone survey. The program enabled us to obtain a series of data from the households and investigate the multiple-dimension information in more depth. Specifically, we were attempting to provide answers to the following queries:

- Why didn't participants return the questionnaire?
- Why did/didn't they **consider** the incentives offered?
- Why did/didn't they **take** an incentive?
- What type of water softener removal program, voluntary or mandatory, would households support?
- How do owners of chloride-based softeners differ in behavior and preference from non-owners?

6.2 Methodology

Participants in this telephone survey were residents of the Irvine Ranch Water District who participated in the Water Treatment Focus Group Meetings held on May 31, 2003. At these meetings attendees agreed to participate in a follow-up telephone survey. This phone call program centered on Focus Group Participants and thus we have continued to track their information from focus group meeting sessions, focus group questionnaires, and general surveys to the telephone survey. This allowed us to chart detailed information on their behavior, preferences, and opinions over a time period of approximately of two and one-half months.

The key target participants in this survey were those who:

- Own chloride-based water softeners, and refused to remove them.
- Intended to buy a water treatment system, but did not take the incentive(s) offered.

Each participant would first be given a position in the *Participant Profile Tree* (see Appendix J, page J-2), which was determined by ownership of a water softener, intent to purchase a water softener, and whether or not consideration was given to the incentive program. Once determined, participants were asked questions that corresponded to their position (see Appendix J, page J-3 for the list of questions). The responses of each participant were then individually summarized (see Appendix K for the individual summaries), followed by a comprehensive summary of results for each question (Please see Section 6.3), from which we could examine participants' opinions towards the key issues related in this program.

6.3 Summary of results

Of the 62 focus group participants, 33 responded to the phone survey. Response rate was 53%. The types of water softeners that they have are summarized in Table 14 below:

Table 14: Type of water softener that focus group participants operate

Type of water softener	Count	% Responded
Chloride-based	8	24%
Non-chloride or portable exchange	8	24%
None	17	52%
Total	33	100%

The following are summaries of the answers to each question:

Question One: Why didn't you return the questionnaire?

Participants who were asked this question most often replied that they had, to the best of their knowledge, returned the questionnaire. Despite our detailed records and the pre-

stamped, pre-addressed envelopes that were provided to them, they argued that the surveys must have been lost in the mail or in our care. Others answered that the constraints of time, due to school or work, hindered their ability and willingness to complete and return the general survey.

Question Two: Why did you consider the incentive program?

Very few participants were directly asked this question, though during their comments, many revealed their reasons for considering the incentive program. In general, those without a water softener considered *option three* of the incentive program, because it appeared to be "a good deal." Since they already desired or intended to purchase a water treatment system, they would naturally welcome a stipend (essentially a discount) of $300.

Select owners of chloride-based water softeners also gave thought to participating in the incentive program. Those who considered *option one* or *option two* reportedly did so primarily based upon environmental interests. Had they not been concerned for the environment, they explained, they would never have considered forfeiting the benefits they received from their water softening systems, nor would they have considered the removal of such a costly investment.

Question 3: Why didn't you consider the incentive program?

Those without water softeners reported that the $300 stipend was a financially insufficient incentive to purchase a non-chloride based system. Most noted that such systems cost well over $1,000, a price well above their budget, even when considering the discount (stipend). They further explained that since they were sufficiently satisfied with their current water quality, they felt no need to further pursue the incentive program.

When asked this question, most owners of chloride-based systems reported that the incentives were simply too small to entice consideration. They explained that the incentives would only cover a small fraction of the costs they had invested into their units. Other owners, suspicious of the severity of the environmental and financial problems, reported that they were simply unwilling to remove their systems until they required replacement, and thus, would not consider either of the incentive options.

Question 4: Why did you take the incentive?

Since none of the participants had accepted an incentive offer, this question went unasked.

Question 5: Why didn't you take the incentive?

Participants asked this question almost uniformly responded that the incentive was not great enough. Regardless of ownership, participants agreed that the incentive would need to be significantly higher to entice acceptance. As stated in the summary of question 3, non-owners pointed out that new non-chloride-based systems were priced well above $1,000, which would still leave a substantial out-of-pocket expense, even after the $300 stipend.

Owners of chloride-based systems bemoaned the fact that the financial incentives offered were insignificant when compared to the costs (in some cases up to $1,800) they incurred when purchasing and installing their current unit. Those most vocal in this category were owners who had recently installed a unit. They asserted that an appealing incentive would realistically need to offer the price of the unit being removed minus depreciation. Though most conceded that they had a true concern for the environment, and that they would replace their current unit with a non-chloride-based softener when necessary, they insisted that they could not afford to incur such removal and replacement costs at this time.

Question 6: Do you support a voluntary or mandatory removal policy? Why?

Table 15 below shows the statistics about households' preferences on voluntary or mandatory removal policy:

Table 15: Summary of the policy people support

	Voluntary		Mandatory		Compromise	
	Count	% Responded	Count	% Responded	Count	% Responded
w/ C-B W.S.*	5	15%	2	6%	1	3%
w/o C-B W.S.*	5	15%	18	55%	2	6%
Total	1	30%	20	61%	3	9%

* Note: C-B W.S. refers to chloride-based water softener

Those households without chloride-based water softeners overwhelmingly supported a proposed mandatory removal program (18 to 5). They cited the environmental and public health concerns, as well as the financial burden incurred by taxpayers, as sufficient cause for banning polluting systems in the water district. This population believed that a voluntary program would realize little participation from owners of chloride-based softeners, and furthermore, that a voluntary program would provide insufficient enforcement to ensure compliance. Those supporting a voluntary program cited a concern for the rights of citizens and the concern that owners of chloride-based systems would eventually waste further tax dollars litigating the legality of the ban. Others (2), in the interest of fairness, supported a compromised policy that would initially establish a voluntary program, which if unsuccessful would give way to a more stringent mandatory program.

Owners of chloride-based water softeners predictably favored a voluntary removal program 5 to 2 over a mandatory program, with one owner supporting a compromised policy. As evident in their individual responses (Please see Appendix K for individual summaries), owners were most concerned with the preservation of their rights. They perceived a mandatory ban to be a hostile act, with several directly mentioning a fear of

"Big Brother" interfering in their lives and trampling on their freedoms. While most conceded a concern for the environmental and financial costs of chloride-based softeners, they shared the opinion that their individual contributions to these problems were insignificant. It is clear from their responses that a voluntary removal problem would realize a substantial free-rider problem, as many owners would rely on the compliance of "the other guy." Perhaps realizing this, two of the owners questioned supported a mandatory program, and one supported a mandatory program in the event that an initially voluntary program failed. According to these dissenters, most owners, including themselves, would comply only if forced to do so. Believing in the severity of the problem, they concluded that a mandatory removal program would eventually, if not immediately, be necessary.

Nearly all participants, regardless of ownership, supported fair compensation for owners of chloride-based water softeners who volunteered to remove, or were forced to remove their units. However, the participant's definition of "fair" seems to depend on whether or not they owned a chloride-based system. Non-owners seemed to universally agree that the stipends offered in the incentive program were fair. Owners, on the other hand, asserted that the "fairness" of the stipends depended upon the length of time that someone had owned the system. According to them, owners of older systems would substantially benefit from the stipends, since they would require replacement in the near future anyway. They concluded, however, that owners of relatively new systems would incur substantial financial loss under the current incentive program, and instead proposed that the program compensate the cost of the unit minus depreciation.

It should be noted here that in the development of the various incentive options, numerous residential water softener providers were consulted in terms of feasibility and acceptability of the options offered. These organizations included nationally known firms such as Culligan and Rayne. One of the suggestions given by the providers was that the creation of a "green" (environmentally sensitive) water-softening device might logically be the best solution to the problem of developing a suitable "incentive" to help consumers abandon the traditional chloride-based unit. Participants commented on the fact that there was no reasonable alternative to the elimination of traditional softeners to

induce them to leave their present systems. It would be logical for a consortium of government agencies and private companies to collaborate efforts in order to develop viable and environmentally friendly alternatives to current technology, however efficient.

7. Comparison Analysis with AWWARF Household Survey

As part of our work on this assignment, our firm was asked to work closely with consultants assigned to the AWWARF project to coordinate some of our efforts as it related to consumer trends and waste water salinity. We made contact with representatives of CH2M HILL, Arizona State University, and Baker Engineering to attempt to coordinate and possibly create a number of questions that could be used by both studies. Coordination of some of the questions for the AWWARF telephone survey with our work was done in early 2003. The following are analyses comparing the demographics of two survey populations:

- The AWWARF survey sample was derived from the results of random digit dialing of 250 households within the Irvine Ranch Water District service area.

- The CGU survey was the result of 876 households responding to a random questionnaire/survey mailing to 4,000 households within the same service area.

Objectives and emphases of these two surveys were quite different. The CGU survey was intended to explore water softener issues surrounding consumer opinions and perceptions in greater depth, especially as regards the tracking of behaviors over time and the introduction of an incentive program to test the validity of behaviors versus consumer intentions. There are, however, some questions such as demographic information, water softener usage issues and water quality issues that can be compared between the two studies.

After evaluation of the data and comparison between the two surveys, significant differences were found between the two population demographics in many categories. The most significant of these differences was the percentage of households that owned water softeners. This represented a difference of almost 10% (14% versus 4%). The following reasons may help to explain this discrepancy.

In the CGU questionnaire/survey, the problems of chloride-based water softeners were briefly described in the introductory information which effectively "tipped the hand" as to how softeners were viewed by the survey takers. This skewing of the intent of the survey might have caused the households that own such water softeners to become quite uncomfortable to admit operating such devices since they were described as contributors to significant environmental problems. This might have caused respondents to be hesitant or less than factual in responding to the questions posed.

The AWWARF survey was conducted through a randomly generated telephone phone call process while the CGU survey was conducted through the mail. Participants usually respond differently when filling out a survey as opposed to the immediacy and feedback of conducting a survey over the telephone. Compare results from Table 14 with Table 1. Results from the CGU survey originally found that participants stated they operated chloride-based water softeners in the survey taken before the focus group meeting, but in actuality when asked specifically, it was discovered that respondents were also referring to portable exchange service or other water treatment devices (such as water purifiers). Accordingly respondents may respond differently when immediate feedback or validation is present or absent during their processing of a survey vehicle.

The following are tables and a graph comparing results on demographic information, water softener issues, and water quality issues from the AWWARF and CGU surveys.

7.1 Comparison of demographic information

Table 16: Income level comparison

Household Income	AWWARF	CGU
Under $15,000	2%	4%
$15,000--$35,000	6%	
$35,000--$65,000	15%	17%
$65,000--$100,000	31%	29%
$100,000--$150,000	26%	28%
Over $150,000	17%	22%
Retired	0%	N/A
Don't know	2%	N/A
Overall	100%	100%

Table 17: Type of home comparison

Type of residence	AWWARF	CGU
Single family house	63%	95%
Multi-family house (e.g., duplex)	2%	0%
Townhouse	12%	2%
Condominium	14%	2%
Apartment	8%	0%
Mobile home or trailer	0%	0%

Table 18: Comparison of "own or rent current home"

	AWWARF	CGU
1 Own	82%	93%
2 Rent	18%	7%
Overall	100%	100%

7.2 Comparison of water softener issues

Table 19: Comparison % of households that own water softeners

	AWWARF	CGU
Yes	14%	4%
No	86%	96%
Don't know	0%	0%
Total	100%	100%

Graph 4 displays percentage comparison as shown in the table above:

Graph 4: Comparison of % of households that own water softeners

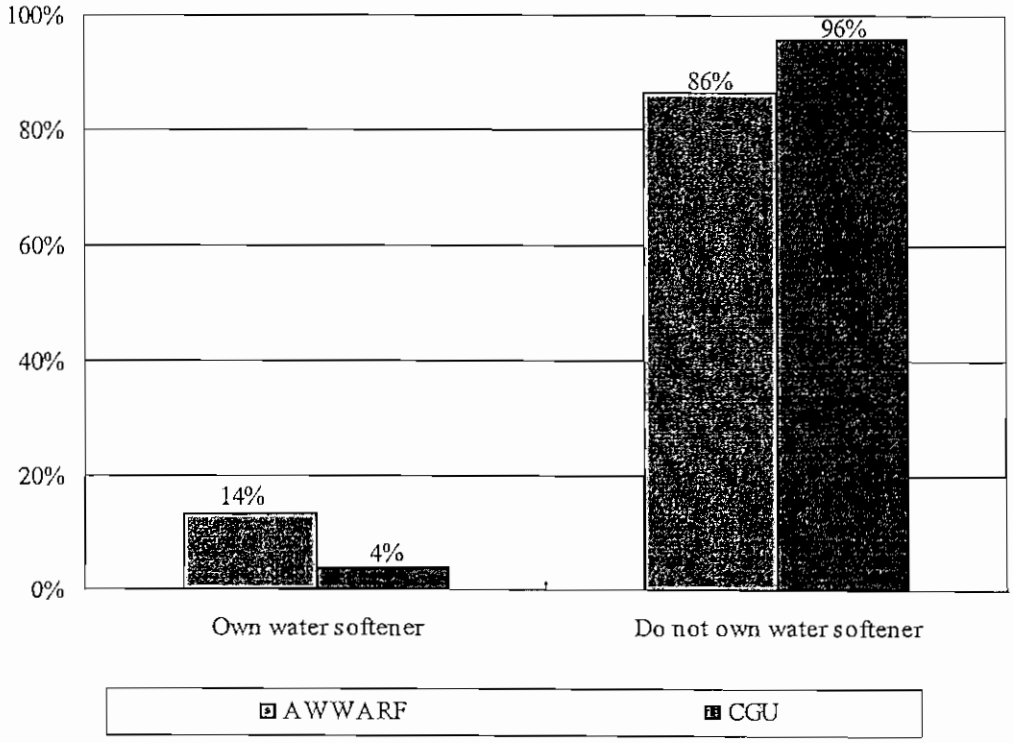


Table 20: Time of installation of water softeners comparison

Time of installation	AWWARF	CGU
In home at purchase	45%	17%
Added at time of move-in	N/A	37%
Added later	55%	40%
Don't know	0%	6%
Overall	100%	100%

Table 21: Comparison of age of water softeners

Age of unit	AWWARF	CGU
Less than 4 years old	82%	74%
4-7 years old		17%
8 years old or more	18%	6%
Don't know	N/A	3%
Overall	100%	100%

Table 22: % households that operate a high-efficiency model (AWWARF results)

	AWWARF
Yes	100%
No	0%
Don't know	0%
Overall	100%

Note that AWWARF results for Irvine Ranch Water District are all designated high-efficiency water softeners.

Table 23: Comparison of whether households regularly use water softeners?

	AWWARF	CGU
Yes	91%	86%
No	9%	9%
Don't know	0%	6%
Overall	100%	100%

Table 24: Comparison of reasons of using water softeners

	AWWARF	CGU (Multiple choices)
To reduce the hardness	67%	86%
To remove contaminants that endanger health	7%	40%
To improve the taste	0%	
To improve appearance	0%	46%
Other	27%	9%
Overall	100%	N/A

7. 3 Comparison of water quality issues

Table 25: Concerned with hardness

	AWWARF	CGU
Very concerned	22%	28%
Somewhat concerned	39%	29%
Maybe	--	28%
Not very concerned	21%	9%
Not concerned at all	18%	6%
Overall	100%	100%

8. Appendices

Appendix A: Output for statistical analysis

Appendix A-1: test for "whether age of water softener has an effect on people decision about whether they would consider converting to a non-chloride-based system"

Two-Sample Kolmogorov-Smirnov Test[1]

Frequencies

	Age of chloride-based	N
Would you considering converting to a non-chloride-based system	Less than 4 years old	27
	More than 4 years old	8
	Total	35

Test Statistics[a]

		Would you considering converting to a non-chloride-based system
Most Extreme Differences	Absolute	.167
	Positive	.167
	Negative	-.088
Kolmogorov-Smirnov Z		.414
Asymp. Sig. (2-tailed)		.995

a. Grouping Variable: Age of chloride-based water softener

[1] Test whether two independent samples (groups) come from the same population.
The Kolmogorov-Smirnov Z test is more general tests that detect differences in both the locations and the shapes of the distributions. -- From SPSS help file.

Appendix A-2: test for "whether age of water softener has an effect on people's decision about which options to choose if forced to remove chloride-based water softener"

Two-Sample Kolmogorov-Smirnov Test

Frequencies

	Age of chloride-based	N
What option would you choose	Less than 4 years old	24
	More than 4 years old	7
	Total	31

Test Statistics[a]

		What option would you choose
Most Extreme Differences	Absolute	.137
	Positive	.137
	Negative	-.101
Kolmogorov-Smirnov Z		.319
Asymp. Sig. (2-tailed)		1.000

a. Grouping Variable: Age of chloride-based water softener

Appendix A-3: test for "whether time of installation of water softener has an effect on people's decision about whether they would consider converting to a non-chloride-based system"

Two-Sample Kolmogorov-Smirnov Test

Frequencies

	Time of installation	N
Would you considering converting to a non-chloride-based system	Part of home purchase	19
	Added later	14
	Total	33

Test Statistics[a]

		Would you considering converting to a non-chloride-based system
Most Extreme Differences	Absolute	.147
	Positive	.147
	Negative	-.019
Kolmogorov-Smirnov Z		.416
Asymp. Sig. (2-tailed)		.995

a. Grouping Variable: Time of installation

Appendix A-4: test for "whether time of installation of water softener has an effect on people's decision about which options to choose if forced to remove chloride-based water softener"

Two-Sample Kolmogorov-Smirnov Test

Frequencies

	Time of installation	N
What option would you choose	Part of home purchase	18
	Added later	11
	Total	29

Test Statistics[a]

		What option would you choose
Most Extreme Differences	Absolute	.354
	Positive	.111
	Negative	-.354
Kolmogorov-Smirnov Z		.924
Asymp. Sig. (2-tailed)		.361

a. Grouping Variable: Time of installation

Appendix A-5: test for "whether income affects people's decision on whether to support financial incentive to remove chloride-based water softeners"

Kruskal-Wallis Test[2]

Ranks

	Income level	N	Mean Rank
Would you support such efforts	Under $65,000	144	342.55
	$65,000-$100,000	207	347.14
	$100,000-$150,000	191	344.93
	Over 150,000	153	358.12
	Total	695	

Test Statistics[a,b]

	Would you support such efforts
Chi-Square	.597
df	3
Asymp. Sig.	.897

a. Kruskal Wallis Test

b. Grouping Variable: Income level

[2] To determine if several independent samples come from the same population. Kruskal-Wallis H test is the nonparametric analog of one-way analysis of variance and detects differences in distribution location. -- From SPSS help file.

Appendix A-6: test for "whether income affects people's decision on whether to consider converting to non-chloride-based water softeners"

Kruskal-Wallis Test

Ranks

	Total household income	N	Mean Rank
Would you considering converting to a non-chloride-based system	Under $65,000	4	14.88
	$65,000-$100,000	10	19.35
	$100,000-$150,000	10	13.85
	Over 150,000	10	20.35
	Total	34	

Test Statistics[a,b]

	Would you considering converting to a non-chloride-based system
Chi-Square	3.456
df	3
Asymp. Sig.	.326

a. Kruskal Wallis Test

b. Grouping Variable: Total household income

Appendix A-7: test for "whether income level has an effect on people's decision about which options to choose if forced to remove chloride-based water softener"

Kruskal-Wallis Test

Ranks

	Total household income	N	Mean Rank
What option would you choose	Under $65,000	4	16.00
	$65,000-$100,000	8	16.44
	$100,000-$150,000	9	17.56
	Over 150,000	10	14.25
	Total	31	

Test Statistics[a,b]

	What option would you choose
Chi-Square	.847
df	3
Asymp. Sig.	.838

a. Kruskal Wallis Test

b. Grouping Variable: Total household income

Appendix B: Invitation and confirmation letter for the focus group meeting (May 31)

Claremont
GRADUATE UNIVERSITY

May 20, 2003

To customers of the Irvine Ranch Water District:

You are cordially invited to participate in a two-hour focus group meeting in Irvine on Saturday May 31st regarding home water treatment. This study is being conducted by the Claremont Graduate University, Claremont, California.

For each person that participates, you will be paid a $150 stipend (one per household). The intent of this focus group session is to gain your opinions about residential water treatment in Orange County, including the use of water softeners.

There will be two sessions available:

- 9:30 AM until 11:30 AM **OR**
- 1:30 PM until 3:30 PM

We hope that you will consider joining us at the Irvine Ranch Water District offices at 3510 Michelson Drive, Irvine, on May 31st to share your opinions and participate. With limited seating, please contact Mr. Kim Knight at Claremont Graduate University to reserve a place as soon as possible at:

- claremont_graduate_u@hotmail.com or (909) 607-1887

Cordially,

Kim Knight
Claremont Graduate University
1017 N. Dartmouth Ave.
Claremont, CA 91711

Event: **Water Treatment Focus Group Meeting**

Conducted by the Claremont Graduate University

Tel: (909)-607-1887

Attendance Incentive: **$150 stipend per household**

Time: 05/31 Saturday, 9:30-11:30 AM

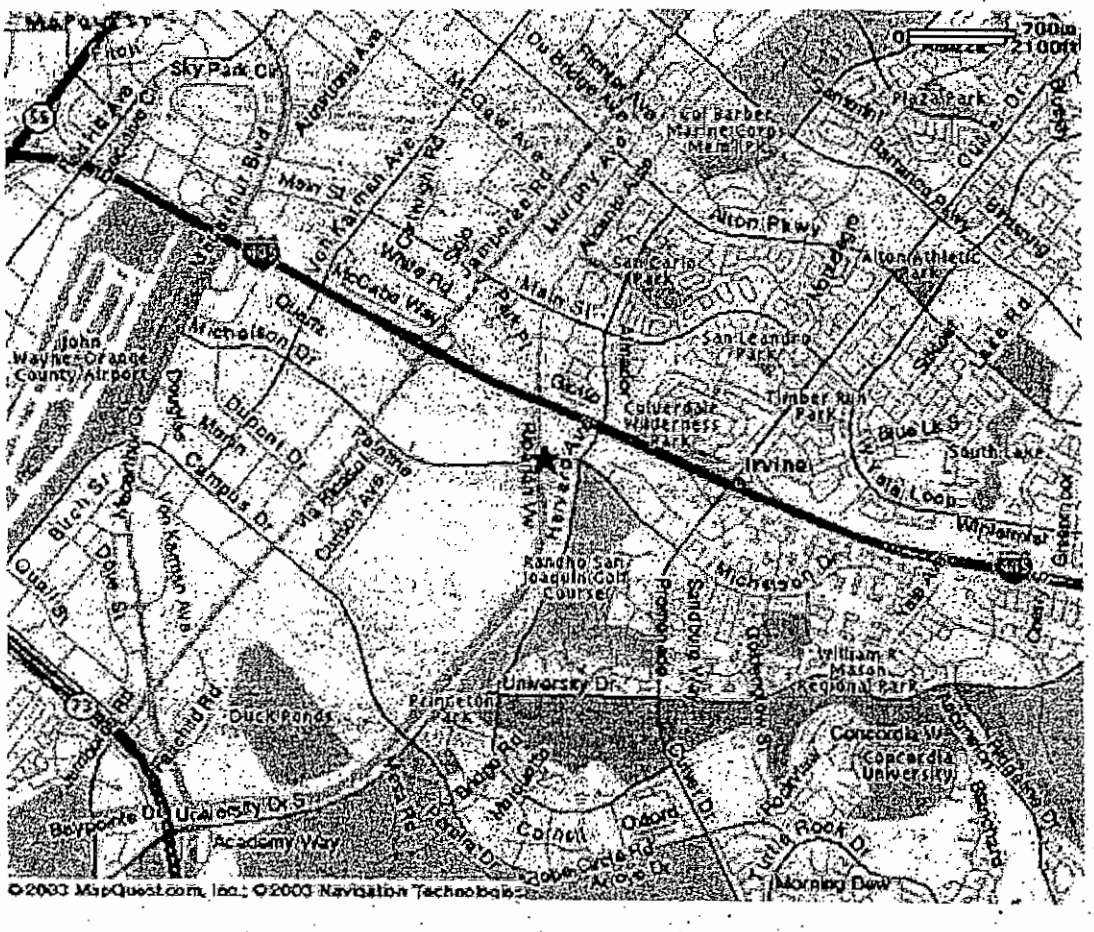
or 1:30 - 3:30 PM

Address: Irvine Ranch Water Company

3510 Michelson Drive

Irvine, CA 92612

Driving direction: Enter facility off of Riparian View (see map)



Claremont
GRADUATE UNIVERSITY

May 26, 2003

Dear

Thank you for your willingness to participate in our focus session concerning water softening and treatment devices and services in your area. This letter will serve to confirm your attendance at the session marked below:

- ☐ 9:30 AM to 11:30 AM
- ☐ 1:30 PM. to 3:30 PM

The meeting will be held in the Activities Room of the Irvine Ranch Water District offices, located at 3510 Michelson, Irvine, CA. **Please bring this letter with you as your proof of admission for the session.** Directions are enclosed.

Your attendance and participation in the question & answer session, combined with your successful completion of some brief questionnaires while attending will qualify you for an incentive check iu the amount of $150 which will be sent to you shortly after our meeting.

We look forward to seeing you on the 31st and gaining your reactions and opinions. If you have any questions please contact us at (909) 607-1887.

Cordially,

(Mr.) Kim Knight
Claremont Graduate University

Enclosure – map

Appendix C: Focus group meeting agenda

The Focus Group Meeting: May 31, 2003
9:30am-11:30am and 1:30pm-3:30pm

Location: Irvine Ranch Water District
3510 Michelson Drive
Irvine, Ca 92612

Objectives:

The main objective of this meeting is to explore consumers' thinking/behavior regarding water treatment and related type of issues. Conventional thinking is that consumers are concerned about quality, availability, cost, health, and perhaps environmental impact regarding water. Results from the meetings will be used to validate/dispute some of these common beliefs of the water industry.

Research method:

The research method employed in this study is qualitative in nature. The purpose is to find out what is in the consumer's mind regarding water related type of issues. It is done in order to access and also get a rough idea about the consumer's perspective. It helps the agencies to become oriented to the range and complexity of consumer activity and concerns. The session will need to be rather unstructured and more intensive, in order to bring out the emotions, needs, motives, attitudes, and values of the consumers towards various issues. This way, there will be a longer and more flexible relationship with the consumers, so the results will have more depth and greater richness of context, which hopefully may mean a greater potential for new insights and perspectives.

The approach of the method is exploratory and validation based. The categories of stimulus provided will be from general to more specific. The sequence of the introduction of stimuli will be as follow:

1. Water issues in southern California.
2. Water softener issues.
3. Potential efforts/initiatives that can help alleviate the problems.
4. Effectiveness of educational efforts.
5. The range and effectiveness of financial incentives.

The key is for consumers to express their point-of-views. Obviously the later points need to be flexible enough and may change based on the progression of the session.

There will be a brief questionnaire to capture their opinions at the beginning and a questionnaire at the end. This will allow the better understanding of the effectiveness of educational efforts. Also, new potential initiatives may be discovered in the sessions. Financial efforts will be tested via the pilot incentive program. After the three-week period of the pilot incentive program, these same participants will be re-contacted via phone to participate in a follow-up interview in order to capture the rationale of their choices.

Participant's responsibilities:

Attend one of the sessions on Saturday, May 31st, 2003.
Participates in the Pilot Incentive Program.
Participates in a follow-up phone interview.

Agenda:

9am-9:30am:	Arrival and sign in. Each person will receive a Participant #.
9:30am-9:40am:	Explain the purpose and format of the session.
9:40am-9:45am:	Participants taking the initial questionnaire.
9:45am:	Discussion session.

1. Water issues in southern California.
   a. Cost
   b. Availability(shortage)
   c. Quality (taste, smell, appearance, health, hardness)

2. Water softener issues.
3. Suggestions on how to alleviate the problems.
   a. What are the strategies?
   b. Who should be responsible for the efforts?
   c. Who should pay for the efforts?

11:15am-11:25am: Participants take the exit questionnaire.

11:25am-11:30am: Closing. Reminder of the Pilot Incentive Program and the follow-up phone interview.

Appendix D: Focus group meeting questionnaires

(General Information, Questionnaire #1, Questionnaire 2A and 2B)

General information

Participant # : _____

Please understand that all information you provide will remain strictly confidential.

1. How much is your total household income (before taxes)?

☐ Under $ 35,000 ☐ $ 35,000 -- $ 65,000 ☐ $ 65,000 -- $100,000
☐$ 100,000 -- $ 150,000 ☐ Over $ 150,000

2. What is your education level?

☐ High School Diploma ☐ Undergraduate or higher ☐ Others

3. What type of home do you live in? Is it a:

☐ Single family house ☐ Multi-family house like a duplex ☐Townhouse
☐ Condo ☐ Apartment ☐Mobile home or trailer

4. How would you rate our water quality, such as odor, taste, and clarity?

☐ Very good ☐ Good ☐ Acceptable ☐ Bad

5. Which of the following properties of water is the most critical to you?

☐ Quality ☐ Availability ☐ Cost ☐ Environment

6. Do you think that the way we use water is causing long term damage to our environment?

☐ Yes ☐ No ☐ Don't know

7. Do you think there will be a water shortage in Southern California in the future?

☐ Yes ☐ No

8. Which of the following you think is the main reason for a shortage?

☐ Consumers wastefulness ☐ Population growth ☐ Drought
☐ Politics ☐ Irrigation farming ☐ Global warming
☐ Overall damage to environment ☐ Other

9. How would you rate your local water agency?

☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Don't know

10. If you wanted advice/information on water treatment issues, such as a water softener, who would you turn to?

☐ Government agencies ☐ Local water district
☐ Water conditioning companies ☐ Home improvement stores
☐ Independent non-profit organization ☐ Environmental group
☐ Development/real estate agent ☐ Homeowners Association or neighbors

Questionnaire #1: Participant #: _____

1. If you own/owned a water softener or use a portable exchange service(e.g. Culligan) or are planning on acquiring one, what was the primary reason/purpose for your purchase?

2. Do you think the use of home water softeners in your neighborhood is a serious problem and if left unresolved will affect the cost, availability, and quality of water in the future?

   ☐ Yes. ☐ No. ☐ Don't know.

   Please explain your choice.

Questionnaire #2A: Participant #: _____

1. Do you think the use of home water softeners in your neighborhood is a serious problem and if left unresolved will affect the cost, availability, and quality of water in the future?

   ☐ Yes. ☐ No.

   Please explain your choice.

2. If you own a water softener, what condition/incentives, if any, would be sufficient for you to voluntarily remove your unit, switch to a non-chloride based system, or use a portable exchange service? Which would be your choice?

3. Did the discussion or the information you received today affect your choice above? How?

Questionnaire #2B: Participant #: _____

1. Do you think the use of home water softeners in your neighborhood is a serious problem and if left unresolved will affect the cost, availability, and quality of water in the future?

   ☐ Yes. ☐ No.

   Please explain your choice.

2. If you are planning to buy a water softener, what condition/incentives do you think are sufficient for you to cancel your plan, or switch to a non-chloride based system, or use a portable exchange service? Which would be your choice?

3. Did the discussion/information you had today affect your choice? How?

Appendix E: Focus group meeting observations

WATER TREATMENT FOCUS GROUP MEETING OBSERVATION

TO: PROFESSOR DAVID KUNG AND KIM KNIGHT

FROM: NANCY TAO

SUBJECT: WATER TREATMENT FOCUS GROUP MEETING

DATE: 5-31-2003

THE PURPOSE OF THE MEETING

Test the changes of people's behavior. Each participant is required to complete two questionnaires. First one needs to be completed before the meeting, in order to learn participants' understanding about these issues before they were educated. Second questionnaire need to be completed after the meeting to find out what is the effects of education. We also want to get participants' idea about how to remove chloride-based water softener, what kind of incentives they need to give up their water softeners.

MORNING SESSION

Total number of participants: 28.

With water softener: 16 (57%), without water softener: 12 (43%)

Participants were concerned about the quality of water and how the water is treated. Most of the participant did not know issues about water softener, such as what it does, what it removes and its environmental damage and disadvantages. Education and information are very important.

Key points from the morning session are,

Current condition of water:

Bottle water is expensive. 7 out of 28 (25%) participants drink tap water directly.

Participants with water softener said, tap water does not taste good as before, and they were concerned about diseases caused by hard water such as kidney stone, heart diseases etc.

People's understanding about water softener:

Water softener can reduce limes in water. We feel better when washing hair using soft water. Most participants with water softeners did not know the differences between exchangeable service and salt-added water softener.

About water treatment:

Participants were also concerned with how much water is reclaimed, how water is treated, what are the uses of reclaimed water, the harm of sodium and chloride, and the cost of reclaiming water, especially reclaiming water that affected by water softener. People want to know the options and

costs of water treatments. They also mentioned using different water for different purposes, e.g. use different water sources for toilet water and drink water.

They believe water should be treated and filtered before get into the house.

One mentioned that Irvine Company should pay more for reclaiming the water.

When asking how about government banning the use of water softener, most people shake their heads to show their disagreements.

What makes you stay away from salt-based water softener?

Education produces better understanding. Information is very important. Most participants don't know the advantages and disadvantages of water softeners. Participants with water softener said, when they bought water softener, the company did not educate them about the impact of water softener.

Some participants suggested surcharging people who use waster softener, putting money into real benefit. This opinion did not get much agreement.

Participants with water softener think the quality of water is not acceptable. Some participants suggested that they are willing to pay premium for pre-treatment and the premium can be just added into the bill. They also suggest that water district should treat water separately.

Some people thought they were doing the best to improve their health and protect the environment, but didn't know the disadvantages of water softener. After the meeting they will look into these issues.

About financial incentives, people think a stipend about 15%-20% of the cost should be enough to remove the chloride-based water softener.

People also suggest that water district install these water treatment instruments and add to the bill.

How to distribute information?

Participants have trust in water district. Some of them suggested that water district could set up a table in Home depot or LOWE'S to educate people and provide information.

Participants prefer group of people sitting down and talking about the issues.

Sales person can provide some information when selling the house.

AFTERNOON SESSION

Total number of participants: 34.

With water softener: 19 (56%), without water softener: 15 (44%)

Cost of water and water treatments is a concern in the afternoon session. The afternoon group is more diversified than the morning group. Similar proportion of people has water softener.

Current condition of water

Availability, quality of water, and population growth are still popular topics

Water bill is low compared to other bills, most people do not read their bills, or only read sometimes.

People's understanding about water softener

Eliminate mineral and hardness. When water is hard "we need more soap".

What makes you stay away from salt-based water softener?

Education is still an option.

After education, subsidize people to replace their water softeners. Most of participants think financial incentive is a good way to keep people from using water softener. Incentives can be rebate and exchange. Some participants with water softener said they do care about environment and they want to give their water softeners up after they know all the disadvantages and environmental damages.

People who get used to soft water may not be willing to remove their water softeners and use hard water.

People without water softener do not want to be charged more.

One participant has an electro-static water softener. He said it was only $300 more expensive. Some other participants consulted him afterwards. This suggests that there are alternative technologies and people are interested in them, but lack the information.

PERSONAL REFLECTION

Education is a very important way to keep people away from using water softener. Most people do not know water softener damages environment. They believed water softener could purify water and eliminate contaminants and thus can improve their health, which is not true.

People need information on how the water is reclaimed and treated, how much it cost, what is the proportion of water can be claimed, and what is the impact of water softener. They also need information about what is the advantage and disadvantage of water softener and other alternative technologies.

This meeting tested the changes of people's behavior after education. Most people expressed that after they learned all the information about water softener, they were willing to give up their water softener. However, people's actual behavior is not always like what they said. There are people who do not care about damages caused by water softener.

June 2, 2003

Reported by: Raymund Chua

WHAT: Focus Group Meeting

WHEN: May 31, 2003 9:30 to 11:30 am

ATTENDEE: David Kung, Kim Knight, Deborah Moore, 4 student observers and 30 residents/respondents

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The meeting started with a question about the respondents' general opinion of the current quality of water in Irvine. The opinions gathered range from price concerns to health concerns to water shortages. There are no obvious differences in the opinions expressed between water softeners owners and non-owners but what is evident is that most of the comments are geared towards health concerns. Two of the respondents concur that there is no national standard in water, the water taste different from State to State. Some are also speculating that hair loss and kidney stone are some of the problems caused by the water. Most of them also concurred that the water in Irvine as well as in other places are musty so they are forced to buy bottled water. In short, they have little to no trust in the water.

The meeting continued with a discussion about water softeners and the effects that it has in the environment. Surprisingly, 14 respondents said they purchased water softeners because of health concerns to decontaminate their water, only 2 respondents said it was to soften the water and prevents residue in faucets. After Professor Kung explained to the respondents what water softeners are for and most especially the effects it has to the environment, some of respondents confess that they know little about water softeners and became a little defensive by saying that the sales person misinformed them about the benefits of water softeners or the salt based water softeners are already installed before they bought their houses. Clearly, there is misperception among the respondents

on the benefits of water softeners. One respondent who initially registered as one who has a water softener suggested that he uses a filtration system called Life Source which got the group discussing.

After enlightening the respondents about water softeners, Professor Kung presented some viable solutions and asked the respondents to suggest more. Some of the solutions discussed are:

1. Portable Exchange – even if this kind of softeners are salt based, they are in containers and they are controlled. But there are 3 respondents (mostly seniors) who currently use portable exchanges and expressed mixed opinions about the service that they get.

2. A Ban on Water Softeners or Penalty Fee – a respondent asked why it was not possible to ban salt based water softeners; Professor Kung explained that it is hard to pass a legislature against freedom of choice. Ms. Moore mentioned that they are on the process of requesting the government to issue a ban but it just takes long.

3. Filtration system – A respondent mentioned that he has a filtration system that decontaminates water. And this is a good option when you want your water decontaminated rather than soften

4. Give it up voluntarily – this option was mentioned but nobody second the option. Although this is honorable, most of the owners of softeners are not receptive to this.

5. Education – Most of the respondent agree that the best way to prevent people from buying or using salt based water softeners is to educate the residences about the harmful effects of softeners some of the ways suggested are:
    - More focus group meeting
    - Conduct information sessions in places like Home Depot or Lowe's
    - The water district website must incorporate a link to information about water softeners
    - The water treatment tour is a good means to inform the people about the harmful effects of water softeners

6. Treat the water from the source (add premium to the bill) – another proposal is to have the water softened from the source.

7. Water districts sell recommended/acceptable softeners – this is an option presented in light of the high cost of having the water softened from the source. Surprisingly, the respondents do not trust the water in Irvine but they do trust the water district that they have good intentions to help the community. If the water district is to recommend or to indorse or to sell a certain brand of water softeners, they would trust it.

Option 5, 6 and 7 were the most widely accepted by the group. Ms. Moore agrees with 5 and 6 but 7 is not an option that the water district is planning to go into

The last major issue that was discussed is "what will it take for water softener owners in general to give up their water softeners"? Even as Dr. Kung pushed for the respondents to give options, the respondents did not give any solid options and did not have a neither a consensus nor a majority opinion. Only one quantifiable option was presented, the water district should subsidize 15-20% of the new system for them to give up their water softeners.

Overall, what came out of the meeting were:

(1) Use filtration system instead of softeners if health concerns is the issue

(2) Without alternatives to water softeners, it is hard to convince people to give up what they came to be used to.

(3) Respondents are not satisfied with the water but they trust the water district so they want the water district offers recommended filtration system and water softeners

(4) Money is not an issue. Paying them to buy another softener is not well received by the respondents

(5) Respondents are willing to pay $25/month or $2000 one time as a premium for softened water from the source

(6) Education is the best option

Some Facts that came out from the meeting:

- 8 respondents out of 30 tried water softeners but do not have one
- 9 respondents out of 30 drink water from the faucet
- 10 respondents out of 30 voiced out that education is the best solution
- 4 people expressed their interest to know the process where the water comes from and goes to
- 5 respondents have salt based water softeners
- 3 respondents have portable exchange systems

June 2, 2003

Reported by: Raymund Chua

WHAT: Focus Group Meeting

WHEN: May 31, 2003 1:30 to 3:30 pm

ATTENDEE: David Kung, Kim Knight, Deborah Moore, 4 student observers and 36 residents/respondents

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Unlike the first group, the afternoon respondents were a little skeptical about what the focus group meeting is all about. I had four respondents (whom I had converse with before the meeting started) asked me what is the real reason behind the meeting. As I reassured them that this is not sponsored by any water softener making company, they remained skeptical. A few minutes before the meeting started, Mr. Kim Knight announced to the group and reassured them that there is nothing hidden behind this focus group meeting aside from wanting to know their opinion about the subject matter on hand. There will be no selling or endorsing of any products. It reassured the crowd.

The meeting started the same with a question about the respondents' general opinion of the current quality of water. Same as with the morning group, there are no obvious differences in the opinions expressed between water softeners owners and non-owners although, this group is much more informed about what softeners are for, although they did not emphasize health concerns as much as the morning session did. One of the respondent expressed that he is using a water softener no matter what; it is not a cost issue, his household just want their water softened.

Since the group is aware of what softeners do for the water, the discussion quickly moved on to how the water is treated and where does it go after. After much explanation, the discussion moved on to generating options. The options discussed are:

1. A Ban on Water Softeners – As discussed, this is not a viable option at this point but the process of legalizing the ban is on its way.

2. Use Electro-Softeners – a respondent purchased electro-softeners or electronic water conditioners, which use very powerful low frequency signals which effectively treat all conditions of water and flow rates. They transmit these signals asynchronously via an aerial to create a strong magnetic field, which has the effect of altering the formation of calcium carbonate crystals (limescale), so that they remain in suspension in small particles and do not form hard crystalline deposits inside pipes, boilers and domestic appliances. This magnetic effect will gradually erode existing limescale deposits, thereby increasing the flow and efficiency of plumbing systems. This is a much more expensive but more environmental friendly alternative to salt based water softeners.

3. Subsidize new softener – while the morning group stressed that money is not an issue, the afternoon group expressed that if they were subsidize 15% - 50% of the cost of the new softener, they would consider it.

4. Having Water Softeners does make sense - A respondent tried to calculate the cost of not having a water softener ($300/5years for the water heater, $50/year for the pipe) and the cost of having one ($1,700 + cost of the salt) and he concluded that it does not economical to have one. But the computation did not consider the fact that the residue or Limescale deposits not only fur up and tend to block the water pipes, especially in heating systems, they also have an adverse effect on kettles, coffee makers, washing machines, dishwashers, electric irons and worst of all usually, the

hidden effect inside the water tank, the boiler and on immersion heaters where in some cases the limescale can be 2 to 3mm thick. Costing an extra 30% on fuel bills and increasing repairs and replacement bills.

5. Education – Most of the respondent agree that the best way to prevent people from buying or using salt based water softeners is to educate the residences about the harmful effects of softeners some of the ways suggested are:
    - More focus group meeting
    - Conduct information sessions in places like Home Depot or Lowe's
    - The water district website must incorporate a link to information about water softeners
    - The water treatment tour is a good means to inform the people about the harmful effects of water softeners

6. Treat the water from the source (add premium to the bill) – although the computations were not verified, one respondent claims that it is cheaper for the water district to build a plant to soften the water from source rather than pay off the 15% who currently use softeners.

When the group was asked "what will it take for water softener owners in general to give up their water softeners"? As expected, they did not give any solid options even as Dr. Kung pushed them to think of creative options that were not the same as the ones from the morning group.

Overall, what came out of the afternoon meeting were:

(1) Use electro-softeners instead of salt based softeners

(2) Might be cheaper for the residence and the water district to build a plant to soften water from the source. Something the water district should seriously look into.

(3) An option is to drop the percentage of water softener users through education and guilt

(4) Education is still the best option. Educate the Home Owners Association so they too can take part.

Some Facts that came out from the meeting:

- 5 respondents expressed their interest to know the process where the water comes from and goes to
- 6 respondents have portable exchange systems
- 13 respondents out of 36 voiced out that education is the best solution

TO: Dr. David Kung and Kim Knight

FROM: Angela Grotto

DATE: June 7, 2003

SUBJECT: Water Treatment Focus Group: Observation Summary

AM Session Observations: Participants *without* water softeners were concerned about where water comes from, when it will run out, taste, amount of fluoride, and quality. Those *with* water softeners were concerned about wasting water, conserving water, costs, taste, and lack of education about water.

Primarily, participants *with* water softeners offered their impression of water softeners, which included the following. They reduce sediments in pipes and water tanks. Questions were asked regarding the impact of water softeners on the environment. Some were aware of filtration systems that do not require salt. Some think it should only be attached to the hot water, and not the drinking water. Questions were asked about how a portable exchange service works. Some were concerned that something bad for the environment is being sold.

When asked what should be done, the following was suggested. Those *without* WS suggested having the water district provide education (classes), providing incentives (e.g., 10-20% of the cost of the new product and up to $700 for those who don't care about the environment), adding a surcharge for pre-treatment as part of the water bill, and providing a comparison of the costs (treatment at the source vs. doing it yourself). Those *with* WS suggested dealing with the end result of the water (e.g., new ways to reclaim water), dealing with the water at the source (pay a premium), banning systems that use salt or charging a penalty fee for those using it, having the water district provide education, providing a cost comparison (maintenance costs and health impacts of different systems), influencing those who have just purchased a home and don't have one yet, and having the water district provide an incentive (e.g., 15-20% of the cost of a new system, $400, $800-900).

PM Session Observation: Participants *without* a WS were concerned about how the population growth and the arid environment will create water problems, conservation, wasting water, availability, recognizing those who conserve, educating young children, sending information with the water bill, and pollution. Participants *with* a WS were concerned about quality, cost, availability, incentives, education, and switching products.

Those *without* a WS thought that water should be fixed at the source, rebates should be offered (should amount to the difference it cost to switch products), education should be provided, people need to justify why they should or shouldn't change, and the typical person is hard to motivate. Those *with* a WS suggested providing education along with rebates (the average person would switch for money), considering the effort and maintenance costs, using the salt clean-up fees to pay for the rebates ($500 to convert or $1000 to just throw it away), enforcing a state law to advise people to conserve, taxing those with harmful systems, and placing warning labels on water softeners. Overall, the water district should be more involved in the educator role, especially for new home owners.

Conclusions/personal opinions: It is apparent that education and an incentive is the most popular suggestion among the participants. I think the education component is crucial, given that many Irvine residents are unaware of the environmental impact of water softeners and the availability of other products that would be less harmful. I agree with those who claimed that we are dealing with different groups of people: those who care and will be willing to switch once they are educated about it, those who don't care and would require a monetary incentive to switch, along with education. The issue of how much to give was not settled in either session.

I think the psychological theory of cognitive dissonance can be applied. When someone is told something that conflicts with their current beliefs/actions, they need to make a change to reduce their dissonance. For example, if someone smokes and is told that they can die from smoking, they can either change their behavior (i.e., quit smoking) or they can change their belief (i.e., "I won't die from smoking because I exercise a lot"). In this case, participants like their current water softener and then learn that it's bad for the environment. Two groups of people emerge: those who will change their behavior and switch products and those who will change their belief, such as thinking that one household switching a product won't make a difference for the environment. The former group only needs education to make this change; however, the latter group needs a monetary incentive to justify a change in behavior.

However, the incentive may not necessarily change their beliefs about water softeners or the environment. More specifically, even with education, some individuals will still not care about the environment, claiming that they made the switch because of the money. I'm not certain what the key purpose is in this case: either changing their systems, becoming educated, or both. The incentive needs to be enough to justify changing their behavior, which requires time and effort. If it is not a sufficient amount, it will be easier for them to simply change their belief to something that will justify their current "bad" behavior (e.g., "I need to continue using a product that harms the environment because it is beneficial for my family"). If the average new system costs $1700, I recommend offering at least $500. If feasible, how old their current system is should be considered in the amount they get back. Money will not be as much of an issue for those with old systems since the investment was not recently made.

George Schoeneman
May 31, 2001

Introduction

The following are my impressions of two focus group sessions regarding the public's response to various methods of reducing chloride-based water softeners. Both sessions were two hours long and were facilitated by Dr. David Kung. The morning group session began at 9:30 and was attended by 30 people, of whom 16 currently owned water softeners. The afternoon session was attended by 36 people, of whom less than half owned water softeners.

I was engaged in administrative duties during the majority of the morning session. Because of this, my comments on it will be brief, and I will refrain from attempting to compare the two sessions, as others will be better equipped to do so.

One common theme between the two sessions that I feel compelled to note is that everyone seemed to have faith in the water district. Several people spoke of it directly – they thought that the district was fair and competent, and that overall quality and cost were good – and others showed their faith by deferring to Ms Moore, the water district representative. They all seemed prepared to support whatever strategy chosen by the district to handle this issue.

Morning Session

The morning session participants – even those who owned water softeners – did not seem to have a clear grasp on the specific function of water softeners. Some believed that they delivered health benefits, and others thought that hard water would damage their pipes. No one knew of the back-end cost or environmental impact of the softeners. Because they felt uninformed on the issue, they focused on education as the best solution. Attempts by Dr. Kung to move them beyond education as a solution were usually met with some resistance.

Owners of the water softeners seemed willing to replace them with non-chloride softeners, but they wanted the water district to supply the replacements, so the consumers could trust them and achieve economies of scale on the purchases. Ms. Moore, of the Water District suggested that this was impossible, or at least unlikely.

Participants seemed agreeable when Dr. Kung brought up the possibility of a rebate system for owners to remove their chloride based water softeners, but they balked when he asked them to offer a reasonable rebate. Only one person responded, suggesting a rebate of 15-20% of the new system cost. No one would suggest a specific dollar amount.

Afternoon Session

The afternoon session participants were slow to accept that this was a problem worth addressing. They were more interested in discussing other water issues, and Dr. Kung was forced to re-focus them on several occasions.

Once they understood the issues regarding water softeners, many of the afternoon participants seemed quite willing to do away with them. Several people suggested banning them altogether, and others seemed agreeable to this measure. When Dr. Kung suggested that this was not a viable alternative, they discussed several other options.

1. Education. They believed that this should both present the issues and make a moral appeal to water softener users. One person described it as "shaming them into doing the right thing."
2. Pay more. Many were quite comfortable with the cost of their water and said that they did not mind if it was increased, either in order to build treat chloride runoff or to soften the water at the source.
3. Use new technology. Only one person in the group knew about electronic, non-chloride softeners, and he owned one. Others seemed interested in switching to this technology, as long as it provided adequately soft water.
4. Pay subsidies to help softer owners switch to new technology or go without softeners altogether.

Option #4, originated by Dr Kung, seemed acceptable initially. When Dr. Kung reminded the group that the money to fund such a program would come from the taxpayers, the idea lost momentum. Those who did not own softeners argued that they did nothing wrong and should not shoulder the burden. One person suggested a softener tax or surcharge on the water bills for softer owners. Another man recommended beginning with education, in hopes that many would remove the softeners voluntarily. After a while, roll out the subsidy program to appeal to the "holdouts."

Like the morning session, these participants were resistant to suggest a specific subsidy or rebate amount. They seemed frustrated by the dual role as payors (as taxpayers) and as payees (as softer owners). They could not decide on a fair amount to spend that would also be a proper incentive. When pressed on this point, some actually became angry.

Conclusions

- After the issues were explained to the participants, they seemed genuinely interested in trying to find a solution to this problem.

- Most participants concluded that education would be the most effective and efficient method of addressing this issue. One person noted that all of their knowledge on the subject came from the softener salesman, which was of course biased. It seems that it will be necessary to counter the efforts by the softener industry, especially at the time when softeners are often purchased: when people move into new homes. Softener companies target these likely customers, and so should any educational efforts.

- Overall, people seemed amenable to rebates, although they felt unable to set a price on such a program. This agreeability was increased when presented with the viable alternative of the electronic water softeners.

- Because of their faith in the water district, the participants seem willing to support the program or direction chosen by the district manage this problem.

Appendix F: General Survey

(Incentive Program Letter and General Survey Questionnaire)

Claremont
GRADUATE UNIVERSITY

May 31, 2003

Dear Resident(s):

This letter and the enclosed questionnaire represent a portion of a major research study on consumer opinions as it relates to water treatment in your neighborhood. Receiving feedback from residents like yourself has become an essential step in providing information to regional water agencies in order to better serve your needs now and in the future. Please understand that all information you provide will remain strictly confidential. We would like to ask you to review the enclosed information, consider the various incentive options, and fill out the questionnaire at your earliest convenience.

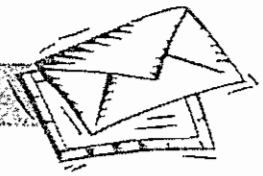
Water Treatment Research Project

In southern California, the diminishing supply of water is developing into an acute problem. This condition is compounded by the significant level of salts in regional water systems generated by residential use of water softeners. This appliance usually is found in your garage or laundry room. You add salt to it periodically and it will chemically condition your water by removing calcium and magnesium. The salt you add will eventually run off into the sewer. Chloride is one of the main components of salt. If present at high levels, chloride can have a negative impact on farms and plants and can harm wildlife. Regional water quality regulatory boards are imposing increasingly tighter limits on chloride discharges. Local water and sanitation districts are facing expensive investments in the water treatment process in order to meet compliance standards now and in the future (please refer to the web page for the LA County Sanitation District: http://www.lacsd.org/chloride/ for related information). One cost-effective solution to this problem is to significantly reduce the amount of chloride discharged into the water system by residences.

In conjunction with our research, a pilot Water Treatment Incentive Program has been designed to encourage households with chloride(salt)-based water softeners to either disconnect their existing units, use alternative methods to treat water in their homes, or switch to high efficiency softener models. For consumers considering the acquisition of a new water softener an incentive is provided to encourage the purchase of a non chloride-based water softener.

-- please turn page over --

Claremont
GRADUATE UNIVERSITY



Water Treatment Research Project

Dear Resident(s),

We are conducting this survey in an effort to learn your opinion about several issues regarding water usage. Your input will help guide water policy so that local water districts can better serve you. Please understand that all information you provide will remain strictly confidential, and no one will ever try to sell you anything if you return the survey.

In southern California, the diminishing supply of water is developing into an acute problem. This condition is compounded by the significant level of salts in regional water systems generated by residential use of water softeners (you add salt to it periodically). The salt you add will eventually run off into the sewer. Chloride is one of the main components of salt. If present at high levels, chloride can have a negative impact on farms and plants and can harm wildlife. Regional water quality regulatory boards are imposing increasingly tighter limits on chloride discharges. Local water and sanitation districts are facing expensive investments in the water treatment process in order to meet compliance standards now and in the future (please refer to the web page for the LA County Sanitation District: http://www.lacsd.org/chloride/ for related information).

Thank you for your participation, and please accept the enclosed gift as a token of our appreciation.

Sincerely,

Kim Knight
Claremont Graduate University

Section1: General information

1. What is your Zip Code? _____

2. Do you own or rent your current home?
☐ Own ☐ Rent ☐ Other

3. How long have you lived in your home? _____

4. Including yourself, how many people currently live in your home? _____

5. What type of residence do you live in?
☐ Single family house ☐ Multi-family house like a duplex ☐ Townhouse
☐ Condominium ☐ Apartment ☐ Mobile home or trailer

Section 2: Users of cloride(salt)-based water softeners (all others please skip to section 3)

14. Do you use your water softener (i.e. it is connected and you regularly add salt)?

☐ Yes ☐ No ☐ Don't know

15. How old is your water softener?

☐ Less than 4 years old ☐ 4 – 7 years old ☐ 8 years old or more ☐ Don't know

16. Was it already in the home before you moved in, or did you add it?

☐ In home at purchase ☐ Added at time of move-in ☐ Added later ☐ Don't know

17. Why do you use a water softener? (Check all that apply)

☐ To reduce the hardness ☐ To improve appearance, taste, and smell

☐ To remove contaminants that may endanger health

☐ Other, please specify_____

18. How important is it to you to have a water softener at home?

Not Important – – – – – – – – – – – – **Very Important**				
1	2	3	4	5
☐	☐	☐	☐	☐

19. Chlorides (salt) have been found to damage the environment, and they are costly for water districts to remove. New non-chloride-based water softeners do not have these drawbacks, but they tend not to work as well, and they are approximately $300 more expensive. Would you consider converting to a non-chloride-based system?

Definitely No – – – – – **Maybe** – – – – – – **Definitely Yes**				
1	2	3	4	5
☐	☐	☐	☐	☐

20. If, due to government regulations, you were required to remove your current chloride (salt)-based water softener from your home, which option would you choose?

☐ Remove your water softener, with no replacement.

☐ Remove your water softener and replace it with a non-chloride-based water softener, which costs approximately $1500.

☐ Remove your water softener and upgrade to a new high efficiency chloride-based water softener, which costs approximately $1200.

21. What is your rationale for your choice to question 20 above:

☐ Less environmental demage ☐ Avoid Water shortage ☐ Want to maintain full water softness

☐ Less expensive ☐ Other _____

Thank you for your cooperation in this survey

Appendix G: Information package on water softener and water treatment devices

(Letter, Information from the Internet, and Advertisements)

Claremont
GRADUATE UNIVERSITY

June 20th, 2003

Dear Resident(s),

Thank you for your interest in the Pilot Incentive Program regarding water treatment in your community. We have prepared some additional information regarding water treatment for your review. This represents our efforts to assist you in making a sound decision regarding water treatment in your home. By no means are we endorsing any of the organizations involved/provided. These organizations and corresponding information are available online that you can access on your own. Websites such as the following can be helpful in providing you with information:

www.nsfconsumer.org www.hardwater.org

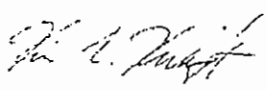
Regarding the high efficiency chloride-based water softener, most of the local vendors carry them. And most units in the market over $1,000 are of the high efficiency type. By using sensors and newer technology, they require significantly less salt than older models (particularly those that are on timers).

Regarding non-chloride based systems, these are newer technologies, such as electro-static or magnetic systems. Some of the vendors can be located by searching the Internet.

If you have questions about qualification of your intended purchase, please contact us ahead of time. In order to complete your participation of the pilot incentive program, you will need to provide the proof of purchase/removal as described in the original letter so that we can issue you the applicable incentive stipend.

Again, thank you for your participation and please contact us at 909-957-1556 or claremont_graduate_U@hotmail.com if we can provide further assistance. For mail correspondence, please write to:

Kim Knight
Claremont Graduate University
1017 N. Dartmouth Ave.
Claremont, CA 91711



(Mr.) Kim Knight
Claremont Graduate University

NSF International

Consumer Information

Home Water Treatment Devices

The NSF Water Treatment Device Certification Program requires extensive product testing and unannounced audits of production facilities. The goal of this program is to provide assurance to consumers that the water treatment devices they are purchasing meet the design, material, and performance requirements of national standards.

- Selecting and Using Water Treatment Devices
- Drinking Water Treatment Technologies
- Styles of Water Treatment
- The Importance of Certification
- Additional Information
- Search for Certified Products

Selecting and Using Water Treatment Devices

Many consumers have difficulty determining whether they actually need a water treatment system or they are not sure what type of system would be best for them. The choice regarding whether or not to install and use a water treatment system is up to you. If you have identified a specific contaminant whose presence in your water is causing you concern, you can use the drinking water treatment units online product database to try to locate products that have been certified to reduce that specific contaminant.

Consumers are encouraged to educate themselves about the quality of their current drinking water supply. By attempting to identify the contaminants that are present in your water supply, you can then ensure that you are selecting a water treatment system that will be capable of treating those specific contaminants.

It is important to keep in mind that all home water treatment devices need regular maintenance to operate effectively. Please read the operating manual that comes with your water treatment system to ensure you are operating your system in accordance with the manufacturer's directions. Filter cartridges should be changed on a regular basis as recommended by the manufacturer.

Drinking Water Treatment Technologies

The products on the market today utilize many different technologies. NSF

currently evaluates residential water treatment products that utilize one of the technologies listed below. The applicable NSF/ANSI standard that applies to each technology is shown in parentheses.

Technology	Description of Product Technology
Adsorption (NSF/ANSI 42 & 53)	This is the physical process that occurs when liquids, gases, dissolved or suspended matter adhere to the surface of, or in the pores of, an adsorbent medium. Carbon filters use this technology to filter water.
Softeners (NSF/ANSI 44)	Water softening devices covered by Standard 44 use a cation exchange resin, regenerated with sodium chloride or potassium chloride, to reduce the amount of hardness (calcium, magnesium) in the water. The hardness ions in the water are replaced with sodium or potassium ions.
Ultraviolet Treatment (NSF/ANSI 55)	This treatment style uses ultraviolet light to disinfect water (Class A systems) or to reduce the amount of heterotrophic bacteria present in the water (Class B systems).
Reverse Osmosis (NSF/ANSI 58)	A process that reverses, by the application of pressure, the flow of water in a natural process of osmosis so that water passes from a more concentrated solution to a more dilute solution through a semi-permeable membrane. Most reverse osmosis systems incorporate pre- and post-filters along with the membrane itself.
Distillers (NSF/ANSI 62)	These systems heat water to the boiling point and then collect the water vapor as it condenses, leaving many of the contaminants behind, particularly the heavy metals. Some contaminants that convert readily into gases, such as volatile organic chemicals, may be carried over with the water vapor.

Styles of Water Treatment Devices

There are several styles of water treatment devices available on the market today. The most common styles are listed below, along with a brief description of each.

Point-of-Entry (POE) System

These systems typically treat most of the water entering a residence. Point-of-entry systems, or whole-house systems, are usually installed after the water meter. (Water meters are usually located in the basement of a house. In warm weather climates, the water meter may be in the garage or outside of the house.) A water softener is an example of a POE system.

Point-of-Use (POU) System

These systems typically treat water in batches and deliver water to a single tap, such as a kitchen sink faucet or an auxiliary faucet mounted next to the kitchen sink. The following information contains a brief explanation of different POU systems and points to consider when determining which style of a system will best suit your needs. The list is ordered from easiest installation/operation to more difficult or complex installation/operation and should not be construed as any type of recommendation.

Personal Water Bottle	This type of product consists of a bottle and a filter. The filter may be integrated with the push/pull cap of the filter or may be integrated with a straw.
Pour Through	In pour-through products, gravity causes water to drip through a pitcher, which is usually stored in the refrigerator. They typically have a lower capacity (i.e. can filter fewer gallons) than other types of systems.
Faucet Mount	This type of filter is mounted on an existing kitchen sink faucet (usually replacing the aerator or installed immediately before the aerator). A diverter is usually used to direct water through the system when treated drinking water is desired.
Counter-Top Manual Fill	This system is usually placed on a counter and filled by pouring water into the system and activating it for a batch of water. (A manual fill distiller is usually considered to be a Counter-Top Manual Fill.)
Counter-Top Connected to Sink Faucet	This product is usually placed on a counter and connected by tubing to an existing kitchen sink faucet. The treated water dispenses out of a return tube from the kitchen faucet, or the treated water is dispensed from a spout on the system.
Plumbed-In	This type of system is usually installed under the sink and requires a permanent connection to an existing water pipe. The filter water is dispensed through the existing sink faucet.
Plumbed-In to Separate Tap	This product installs in the same manner as plumbed-in systems (above). However, the filter water is dispensed through an auxiliary faucet mounted next to the kitchen sink. People who live in apartments may not want to drill a hole in the counter top.

The Importance of Certification

In the last decade, interest in home water treatment products has grown tremendously. Unfortunately, it isn't always easy for consumers to know whether or not a particular product will actually be as safe and effective as the manufacturer claims at reducing various contaminants from your water supply.

NSF has a long history of developing and running independent product testing programs. In fact, we are the leading independent tester of home water

treatment products on the market today. With our state-of-the-art laboratories and highly skilled staff, we have the knowledge and expertise to effectively evaluate water treatment products, including:

- Adsorption filters (i.e. carbon, charcoal, KDF, ceramic)
- Reverse osmosis systems
- Water softeners
- Distillation systems
- Ultraviolet disinfection products.

As an added assurance for consumers, NSF requires that all products meet annual re-certification requirements. Unannounced plant inspections and periodic retesting of all certified products are required of all NSF-listed companies. This unique requirement allows us to ensure that the products we certify continue to meet all stated requirements year after year.

Additional Information/Links

For a complete list of NSF-certified drinking water treatment products, please visit our drinking water treatment units online product database.

For further questions regarding NSF or any of its product certification programs, please contact our Consumer Affairs Office.

Consumers can view our online Contaminant Guide, which provides detailed information on many of the contaminants and treatment chemicals which are commonly found in water supplies.

You may also obtain an online copy of the Contaminant Reduction Testing Protocols used by NSF to test water treatment products for performance capabilities.

To assist consumers in obtaining further information on the subject of water quality and treatment, NSF has assembled the following list of resources:

- Environmental Protection Agency
- National Ground Water Association
- Well Owner Web Site

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NSF Product and Service Listings

Searching for **NSF Certified Drinking Water Treatment Units** is quick and easy. If you have any problems, please contact NSF International. For more information, please visit the NSF Drinking Water Treatment Units Program.

NSF offers several ways to **Search for Drinking Water Treatment Units**:

By Manufacturer | By Reduction Claim, Type | By Model Name, Standard, Type | Complete Listings

MANUFACTURER Enter at least three letters of a Manufacturer Name.

[ ] Search by Manufacturer

REDUCTION CLAIM Choose one or more Reduction Claims, or leave blank.

Reduction Claims for Drinking Water Treatment Units - Aesthetic Effects

- [ ] Bacteriostatic Effects
- [ ] Chloramine Reduction
- [ ] Chlorine Reduction
- [ ] Hydrogen Sulfide Reduction
- [ ] Iron Reduction
- [ ] Nominal Particulate Reduction
- [ ] Scale Control
- [ ] Styrene Reduction
- [ ] Taste and Odor Reduction
- [ ] Zinc Reduction

Reduction Claims for Cation Exchange Water Softeners

- [ ] Barium Reduction
- [ ] Radium 226/228 Reduction
- [ ] Softener Performance

Reduction Claims for Drinking Water Treatment Units - Health Effects

- [ ] 2,4,5-TP Reduction
- [ ] 2,4-D Reduction
- [ ] Alachlor Reduction
- [ ] Arsenic (Pentavalent)<=50 ppb Reduction
- [ ] Asbestos Reduction
- [ ] Atrazine Reduction
- [ ] Benzene Reduction
- [ ] Cadmium Reduction
- [ ] Carbofuran Reduction
- [ ] Carbon Tetrachloride Reduction
- [ ] Chlordane Reduction
- [ ] Chlorobenzene Reduction
- [ ] Copper Reduction
- [ ] Cyst Reduction
- [ ] Dibromochloropropane Reduct.
- [ ] Endrin Reduction
- [ ] Ethylbenzene Reduction
- [ ] Ethylene Dibromide Reduction
- [ ] Heptachlor Epoxide Reduction
- [ ] Lead Reduction
- [ ] Lindane Reduction
- [ ] MTBE Reduction
- [ ] Mercury Reduction
- [ ] Methoxychlor Reduction
- [ ] Monochlorobenzene Reduction
- [ ] O-Dichlorobenzene Reduction
- [ ] P-Dichlorobenzene Reduction
- [ ] PCB Reduction
- [ ] Radon Reduction
- [ ] Simazine Reduction
- [ ] Styrene Reduction
- [ ] TTHM Reduction
- [ ] Tetrachloroethylene Reduction
- [ ] Toluene Reduction
- [ ] Toxaphene Rednction
- [ ] Trichloroethylene Reduction
- [ ] Turbidity Rednction
- [ ] VOC Reduction
- [ ] Xylenes Reduction

Reduction Claims for Ultraviolet Microbiological Water Treatment Systems

- [ ] Disinfection Performance, Class A
- [ ] Disinfection Performance, Class B

Reduction Claims for Reverse Osmosis Drinking Water Treatment Systems

- [ ] Arsenic (Pentavalent)<=300 ppb Reduction
- [ ] Arsenic (Pentavalent)<=50 ppb Reduction
- [ ] Asbestos Reduction

- [ ] Barium Reduction
- [ ] Cadmium Reduction
- [ ] Chromium (Hexavalent) Reduction
- [ ] Chromium (Trivalent) Reduction
- [ ] Copper Reduction
- [ ] Cyst Reduction
- [ ] Fluoride Reduction
- [ ] Lead Reduction
- [ ] MTBE Reduction
- [ ] Mercury Reduction
- [ ] Nitrate Reduction
- [ ] Nitrate/Nitrite Reduction
- [ ] Radium 226/228 Reduction
- [ ] Selenium Reduction
- [ ] TDS Reduction
- [ ] Turbidity Reduction
- [ ] VOC Reduction

Reduction Claims for Drinking Water Distillation Systems

- [ ] Arsenic Reduction
- [ ] Barium Reduction
- [ ] Cadmium Reduction
- [ ] Chromium (Hexavalent) Reduction
- [ ] Chromium (Trivalent) Reduction
- [ ] Chromium Reduction
- [ ] Copper Reduction
- [ ] Fluoride Reduction
- [ ] Lead Reduction
- [ ] Mercury Reduction
- [ ] Selenium Reduction
- [ ] TDS Reduction

PRODUCT TYPE Choose a Product Type from the drop-down menu. All Product Types

SEARCH Reset

MODEL NAME OR MODEL NUMBER Enter at least three letters of a Name or Number, or leave blank.

PRODUCT STANDARD Choose a Product Standard from the drop-down menu. All Product Standards

PRODUCT TYPE Choose a Product Type from the drop-down menu. All Product Types

SEARCH Reset

COMPLETE LISTINGS View complete Listings of Manufacturers or Products. All Manufacturers All Products

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What is hard water?
Problems with hard water
Testing for hard water
Water treatment
Hard water FAQ
Water Softener Comparison
Water Conditioner Comparison
Contact us

Quick Links:

Reverse Osmosis Filters
Chemical Water Softeners
Mechanical Water Softeners
Magnetic Water Softeners

Other Sites:

new Water Treatment Info
new Water Pollution Forums

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Water Treatment Methods

There are many commercial ways of treating hard water including water filters, water softeners, electromagnetic water conditioners and reverse osmosis. In this section we will look at the pro's and con's of several of the available methods to treat hard water.

Method	Chemical Water Softeners	Water Filters	Mechanical Water Softeners	Magnetic Water Conditioners
Description	Chemicals added in laundering process	Drinking water from the tap is filtered with a portable unit	Permenantly installed in plumbing system to replace calcium and magnesium with sodium	Permenantly installed in plumbing system to alter calcium ions so they cannot cause limescale
Advantages	Removes Calcium and Magnesium and lengthens lifespan of clothes	Output water is fit for drinking Chlorine removed Water Softened	Prevents Limescale Increases heating efficiency Lengthens lifespan of clothes	Output water is fit for drinking Prevents Limescale Increases heating efficiency Lengthens lifespan of clothes Calcium retained, good for diet Low running cost
Disadvantages	Output water is not fit for drinking	Does not prevent limescale deposits in pipes and heating system	Output water may not be suitable for drinking Expensive	
Approximate Cost		< £0.03 ($0.05) / litre	£1000 ($1400) Unit + Installation £100 ($140) / Year - Salt + Electricity	£60 ($90) Unit + Installation £5 ($7) / Year - electricity
Recommended Manufacturers		**Brita Worldwide**	**Worldwide Water Systems**	**Water Imp**

Packaged Water Softeners

These are chemicals which help to control water hardness. There are two types, precipitating and non-precipitating.

Precipitating water softeners include washing soda and borax. These products form an insoluble precipitate with calcium and magnesium ions. The

mineral ions then cannot interfere with cleaning efficiency, but the precipitate makes water cloudy and can build up on surfaces. Precipitating water softeners increase alkalinity of the cleaning solution and this may damage skin and other materials being cleaned.

Non-precipitating water softeners use complex phosphates to sequester calcium and magnesium ions. There is no precipitate to form deposits and alkalinity is not increased. If used in enough quantity, non-precipitating water softeners will help dissolve soap curd for a period of time.

top

Mechanical Water Softeners

Mechanical water softening units can be permanently installed into the plumbing system to continuously remove calcium and magnesium.

Water softeners operate on the ion exchange process. In this process, water passes through a media bed, usually sulfonated polystyrene beads. The beads are supersaturated with sodium. The ion exchange process takes place as hard water passes through the softening material. The hardness minerals attach themselves to the resin beads while sodium on the resin beads is released simultaneously into the water.

When the resin becomes saturated with calcium and magnesium, it must be recharged. The recharging is done by passing a salt (brine) solution through the resin. The sodium replaces the calcium and magnesium which are discharged in the waste water.

Hard water treated with an ion exchange water softener has sodium added. According to the Water Quality Association (WQA), the ion exchange softening process adds sodium at the rate of about 8 mg/liter for each grain of hardness removed per gallon of water.

For example, if the water has a hardness of 10 grains per gallon, it will contain about 80 mg/liter of sodium after being softened in an ion exchange water softener if all hardness minerals are removed.

Because of the sodium content of softened water, some individuals may be advised by their physician, not to install water softeners, to soften only hot water or to bypass the water softener with a cold water line to provide unsoftened water for drinking and cooking; usually to a separate faucet at the kitchen sink.

Mechanically softened water is not recommended for watering plants, lawns, and gardens due to its sodium content.

Go to our **REVIEW** page to see a comparison of water softeners

top

Water Filters

Water filters generally come in two forms. Portable ion exchange water

filters, and reverse osmosis water filters. Both are used for "point of use" drinking water, that is, to filter out harmful or unwanted particles before the water is used for human consumption.

Reverse Osmosis works by forcing the water through a semi-permeable membrane, that stops certain particles from passing through.

Portable water filters work using a cartridge containing activated carbon and ion exchange resin. The carbon absorbs and helps reduce the levels of chlorine and chlorine compounds, as well as pesticides, colour and other organic substances. This improves taste and appearance. The ion exchange resin works to reduce temporary hardness.

Water filters cost approximately $0.04 (£0.025) / litre to run.

top

Magnetic Water Conditioners

Electromagnetic water conditioners are a relatively new invention. The idea is that by passing water through a magnetic field, the calcium and magnesium ion's are altered in such a way that they loose their ability to cause scale.

This has a number of benefits; although the water is not technically soft, it has the useful properties of soft water, that is, it won't cause limescale in your pipes thus increasing heating efficiency and lengthening the lifespan of any clothes washed in the conditioned water.

Calcium is an important dietary element, so the fact that conditioned water still retains its calcium content is an added benefit.

While some people are skeptical this method actually works, we have found one manufacturer who has commisioned a scientific analysis by the University of Bath that concludes that their device does indeed stop the build up of limescale.

Go to our **REVIEW** page to see a comparison of magnetic water conditioners

top

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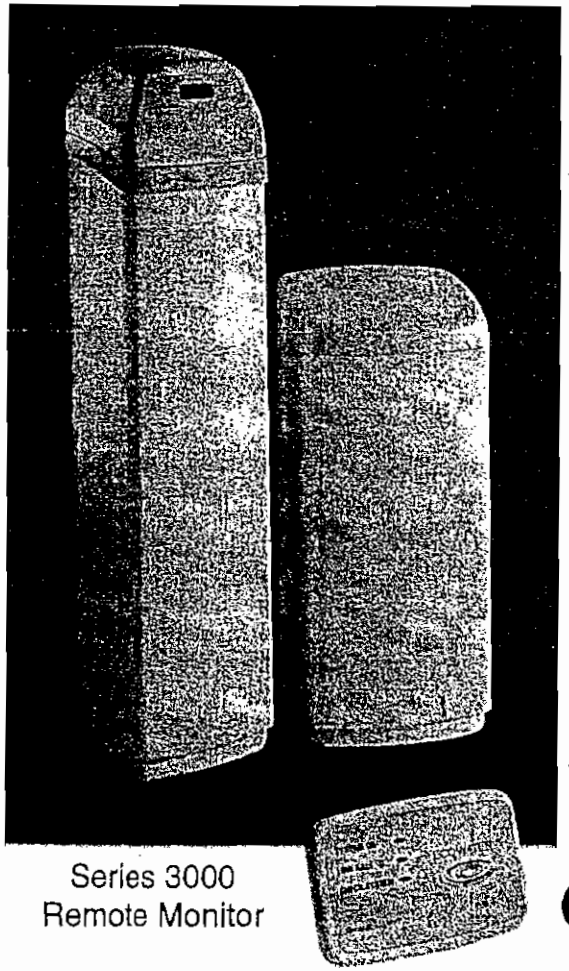

Series 3000
Remote Monitor

The Joy And Comfort Of High-Tech Water System

Worry-free Maintenance. With EcoWater's exclusive and advanced electronics, the remote monitor flashes to alert you when potassium or service is needed. The remote monitor can be placed anywhere in the home.

Efficient water treatment and faster flow rates. Ecowater Conditioners use a patented blend made from two mesh sizes of resin. The top layer is a fine mesh size that has more surface area that provides better iron and hardness removal. The bottom layer is a standard mesh size that improves flow capacities. The result: a resin bed that provides efficient water treatment without sacrificing faster flow rates.

Self-adjusts to your personal needs. The conditioner has a built-in memory that tracks and records usage for each day of the week. Using this information and the exclusive Ecowater Systems Algorithm, the conditioner calculates the amount of water you will need the following day. After reviewing the amount of conditioned water left in the unit, it determines whether or not to regenerate for greater efficiency.

Enjoy programmed memory without interruption. The programmed memory is permanent and is not affected by interruption such as power outage. The timer has a reserve power supply called a SuperCap II capacitor. This rechargeable device will power the timer for more than 72 hours without electricity. Because the SuperCap II recharges automatically, there are never batteries to buy or dispose of.

Ease and comfort of transmitting data for service evaluation. The conditioner is equipped with EASE (EcoWater's Automated Service Evaluation) that allows you to dial up a diagnostic center and transmit data via a mobile phone. This information is reviewed by an EASE technician taking note of water usage pattern, the amount of water used daily, how much hardness the conditioner is removing, how well the conditioner controls are functioning, how effectively the valve is functioning, and how efficiently the water is being conditioned. If a service call is necessary, EASE can tell the service tech what repairs and parts are needed.

Good Housekeeping Promises

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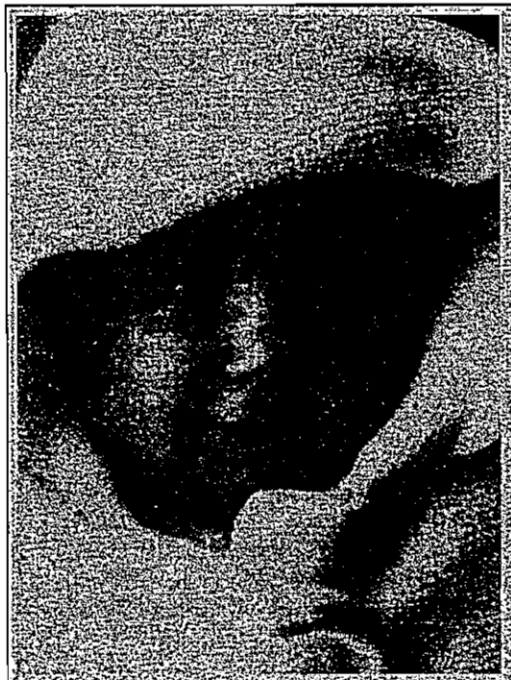
Water Quality Association MEMBER



Improving The Quality Of Your Water...& Life!

ECOWATER SYSTEMS®

SINCE 1925

MORE THAN JUST GREAT DRINKING WATER

- Whole house *softened* and *filtered* water
- Helps make skin soft & hair shine
- Helps get laundry, dishes, and silverware as clean as your water
- Saves money on soap, lotions, beverages, and time cleaning

$200 OFF!

Whole House System

On approved credit. New customers only. Not valid with any other offer. Must present coupon at time of purchase. Limited time offer

If You Demand Performance, Look No Further!

EcoWater is the largest manufacturer of residential water treatment systems in the world. Since 1925, we have been providing families with high quality water. In fact, we are responsible for the most contemporary innovations throughout the world with our state-of the art digital demand electronics. Ultimately, however, our commitment to customer satisfaction is the primary reason for our success. Should you look any further?

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Whole House System

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- Local Water Expertise
- Trusted Leader For Over 60 Years
- Certified Sales & Service Professionals
- 100% Satisfaction Guarantee
- Full Service (Salt Delivery, Filter Changes & More)
- Affordable Water Solutions For The Home & Business

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Only $9.95* A Month

Whole House Water Softener
And Reverse Osmosis Drinking Water

DRINKING WATER
Reverse Osmosis

Better tasting coffee, tea, juices. No more annoying bottles. Richer baby formula. Sparkling fresh clean water right from your kitchen faucet. Better tasting foods and recipes.

SOFT WATER
State-of-the-Art Equipment

No soap scum. No lime build-up. No water spots. Dishes sparkle. No scale build-up. No bathtub ring. Makes your hair shine and skin soft. Laundry is brighter, whiter and softer. Less scrubbing. Less house work!

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For over 65 years, Culligan has been responsible for most of the major advances in water treatment. We've worked hard to build the world's largest network of trained service technicians to support the industry's broadest line of water treatment solutions. And we stand behind our equipment with outstanding warranties and service. Culligan - ***100% Satisfaction Guarantee!***

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Appendix H: Incentive program participants

Participants	Street Name	City Name	Zip	Options
No.1	Larchwood	Irvine	92602	Option 1
No.2	Foxboro	Irvine	92614	Option 3
No. 3	Glorieta East	Irvine	92620	Option 2
No. 4	Kelsey	Irvine	92618	Option 3
No. 5	Lantern Lane	Irvine	92618	Option 3
No. 6	Harrisburg	Irvine	92620	Option 1
No. 7	Stonewall	Irvine	92620	Option 3
No. 8	Fierro St.	Irvine	92614	Option2
No. 9	3699 Wilshire Blvd. Suite 100 (Work)	Los Angeles	90010	Option 3
No. 10	Muir	Irvine	92620	Option3
No. 11		Newport Beach		Option 1

Appendix I: Southern California Salinity Coalition Board of Directors Quarterly Meeting Presentation

(Meeting agenda and PowerPoint slides)

Southern California Salinity Coalition

Board of Directors

Quarterly MEETING

July 10, 2003

10:00 a.m. to 12:00 NOON

Los Angeles County Sanitation Districts
1955 Workman Mill Road
Whittier, CA 90601

AGENDA

1. Call to order

2. Approval of Minutes of April 10, 2003 Meeting.

3. Financial Report.

4. Water Softener Pilot Program - Status Report

    a. Kim Knight and David Kung
    Claremont Graduate University

5. Multi-state Salinity Coalition Meeting of April 15, 2003
    a. Minutes (attached)
    b. Collaborative Declaration (attached)

6. Other Business.

Consumer Behavior on Water Softener Incentive Program

Kim L. Knight
David S. Kung

Claremont Graduate University

July, 2003

Design of Experiment

- Capturing of information from multiple dimensions:
  - Focus group sessions (May 31,2003)
  - Focus group questionnaires (continuous)
  - General survey (by mail)
  - Incentive program (by mail)

Focus Group Sessions

- Misinformation or lack of information
- Participants without water softeners want to regulate change-out
- Participants with water softeners were willing to consider changing with appropriate justifications
- Participants trust water districts

Focus Group Questionnaires

- Participants altered their attitudes toward water softeners throughout the session
- 72% wanted an incentive to change
- 7% refused to change

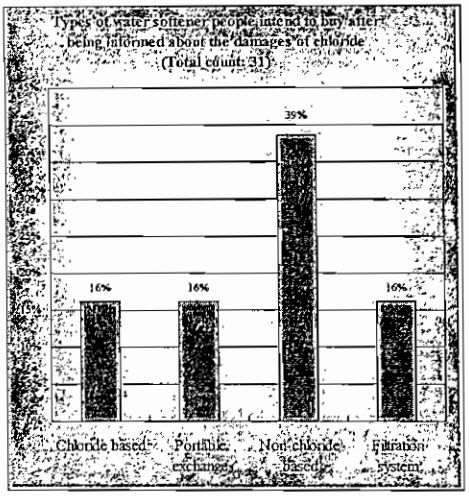
General Survey

What type of water softener people have

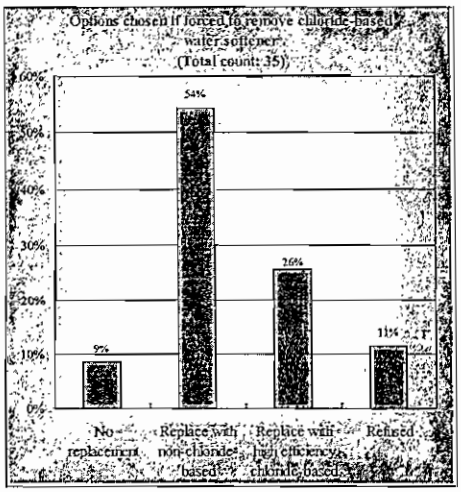
Chloride-based water softener	35	4%
Portable exchange service	51	6%
Other water softener	28	3%
None	733	87%
Total	847	100%

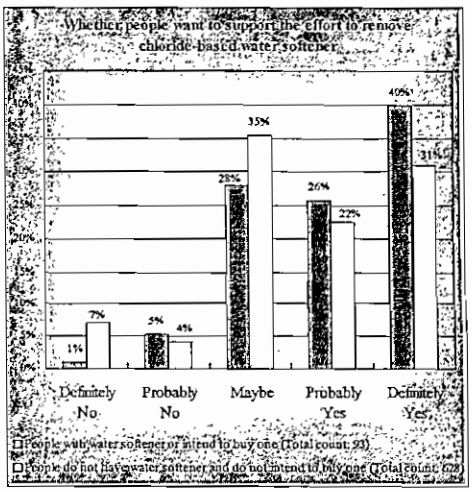
Intend to buy water softener within 12 months

Yes	33	4%
No	606	75%
Don't know	164	20%
Total	803	100%



General Survey (continued)



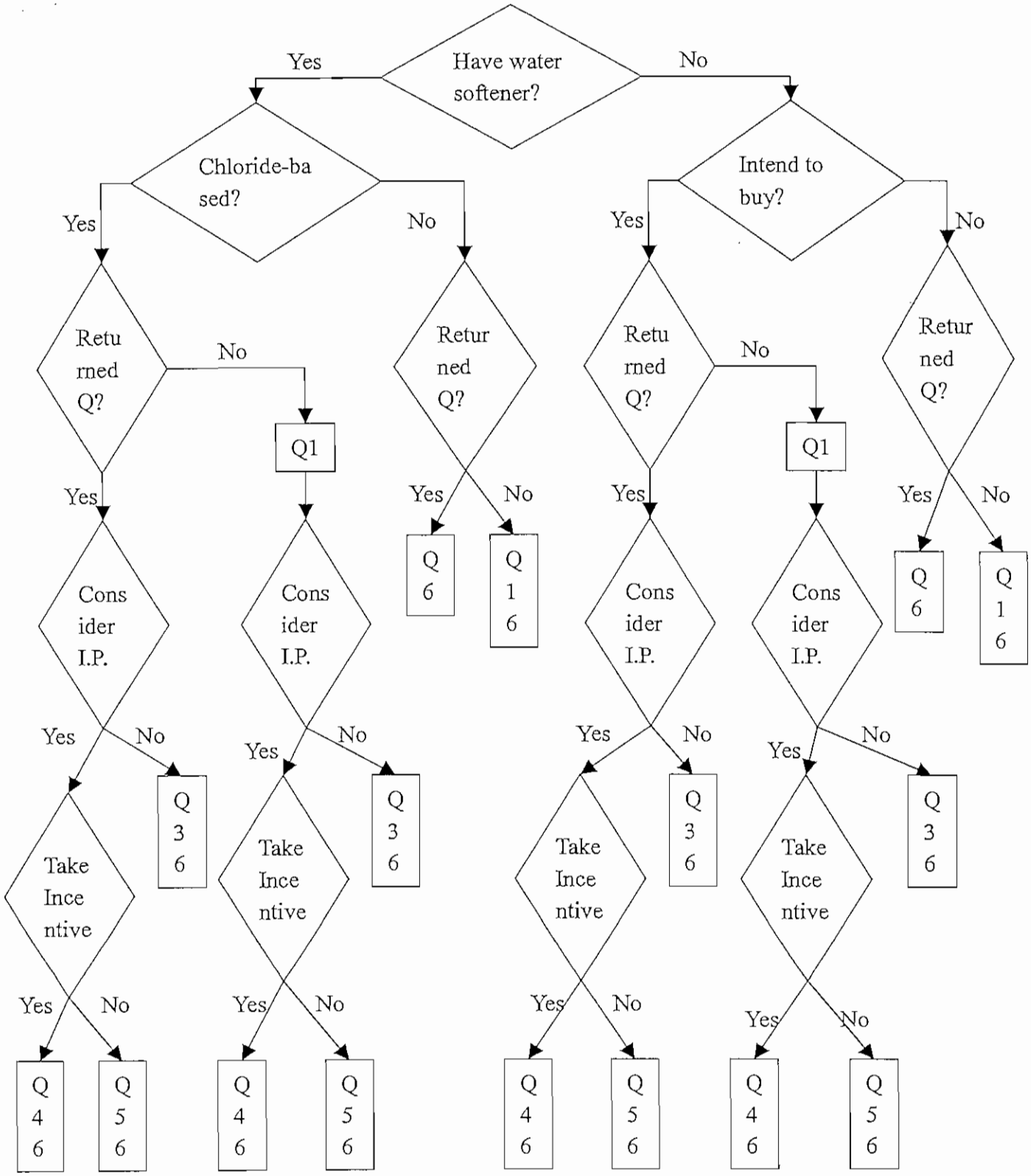


Incentive Program

- Within households with chloride-based water softeners:
  - 8% chose to change to P.E or non-chloride based water softener
  - 8% chose to change to high efficiency model
- Within households planning to buy a new water treatment system, 8% chose non-chloride-based water softener

Appendix J: Follow-up phone-call profile tree and list of questions

Participants Profile Tree **Participant #:** _____



Questions

1. Why didn't you return the questionnaire?
   A. I didn't have time
   B. It is not important to me
   C. I am not interested in these issues
   D. Other, specify:_____

2. Why did you consider incentive program?
   A. Environmental concern
   B. Financial concern (attractive incentive)
   C. Water quality concern
   D. Other, specify: _____

3. Why didn't you consider incentive program?
   A. It is not important to me
   B. I am not interested in it
   C. Not enough incentive
   D. Don't want to give up (or change)
   E. Other, specify: _____

4. Why did you take the incentive?
   A. Environmental concern
   B. Financial concern (attractive incentive)
   C. Water quality concern
   D. Other, specify: _____

5. Why didn't you take the incentive?
   A. Not enough incentive
   B. Don't want to give up (or change)
   C. Other, specify:_____

6. We need your recommendation for the following questions. We have two ways to remove chloride-based water softener. They are,
   1. Voluntary program, incl. financial incentive, education, etc.
   2. Mandatory program, forced removal, regulation, but may include subsidies.

   For people who currently own a chloride-based water softener, which way is better?
   For people who intend to buy a water softener, which ways is better?

Appendix K: Follow-up phone call individual summaries

Follow-up Phone Call

Individual Summary

Participant # 103

Mr. Godina seriously considered taking option three of the incentive program ($300) to buy an environmentally safe water treatment system. However, his current economic situation dissuaded him from taking advantage of the incentive program. He is currently unemployed and because of this he cannot afford the costly difference between the $300 stipend and the price of a non-chloride-based water softener. Mr. Godina believes that the $300 incentive is fair, but he would naturally not oppose an increased stipend. He supports a ban on chloride-based water softeners because he believes that the environmental hazards warrant governmental intervention.

Participant # 106

Participant 106 could not be contacted to take part in the follow-up survey.

Participant # 107

Ms. Kerler does not own a water treatment system and is not considering buying a system. In regards to the incentive program, she was not persuaded by option three because she is satisfied with her current water quality. Furthermore, she is not in favor of the incentive program because she believes that such programs waste tax dollars. She adamantly supports regulation to ban chloride-based systems, but without financial compensation or subsidies.

Participant # 110

Ms. O'Conell does not own a water softener and does not intend to buy system in the future. She feels that the incentive program was fair, but she is currently satisfied with her water quality. She expressed her support for a voluntary removal program that adequately compensated owners of pollutant systems. She did not like the idea of a mandatory program, citing that such a policy would be too controversial and undemocratic.

Participant # 111

Ms. Soto is not interested in purchasing a water treatment system because she is satisfied with her water quality and because she worries about the environmental consequences. Though she was not interested in option three of the incentive program, she feels that the stipend offered was fair. In regards to eliminating chloride-based systems she supports a mandatory removal program. Ms. Soto stated that city/county governments should take responsibility to enforce environmental standard, water quality standards, and also take action to keep water bills as low as possible.

Participant # 113

Mrs. Widmann does not own a water treatment system and does not intend to purchase one in the future. Prior to her participation in the focus group, she had been interested in purchasing a system, because of her dissatisfaction with current water quality. However, she stated that having lived her entire life without a system she could easily live the rest of her life without one. She believes that the incentive program offered fair stipends, but option three did not provide enough incentive for her to personally accept the offer. In regards to removing chloride-based softeners, she supports a voluntary program because she opposes excessive government regulations. She states that she understands the environmental concerns, but she does not feel that they warrant civic action at this time. Were the problem to worsen, she would consider changing her stance, but she currently feels that a voluntary problem and increased public awareness to the issue could substantially curb environmental damage.

Participant # 115

Mrs. Wu does not own a water treatment system but she plans to purchase a non-chloride-based system. She did not consider the incentive program because she did not read the letter thoroughly, and thus was unaware of the stipends. Upon learning of the past offer she expressed interest in option three. She said that she will be researching the prices and effectiveness of non-chloride units, but admitted that she may need a few months to make an ultimate decision. Mrs. Wu favored the mandatory removal policy citing a probable lack of volunteerism and adequate oversight. She expressed concern for the environment, and concluded that such concerns warranted mandatory removal, so long as owners of pollutant systems received fair compensation.

Participant # 116

Ms. Henderson owns a chloride-based water softener and would not consider removing it until it no longer functions. She adamantly stated that its "removal is not an option." She does not feel that the incentives were high enough, and even had they been, she still would not remove her current system until it no longer functions. When that day comes she vows to replace her chloride-based system with a more "environmentally compatible" unit. She supports a voluntary removal program, but insists that she would not participate in such a program until her system ceases to function.

Participant # 117

Ms. Taylor does not intend to buy a water treatment system because she does not feel that she needs one. She adds that the incentive was not great enough to persuade her to purchase and install a water softener. She supports a mandatory removal policy because she does not believe that enough people will voluntarily remove their chloride-based softeners. She insists that if environmental damage caused by pollutant systems is so severe, then regulations banning chloride-based systems are warranted.

Participant # 118

Mr. Chou does not own a water softener nor does he intend to purchase one. He did not consider option three in the incentive program because he is satisfied with the quality of his water. In regards to a removal policy, Mr. Chou supports mandatory removal as long as subsidies are provided. He feels that a mandatory program would best help to control environmental problems.

Participant # 119

Participant 119 could not be reached to participate in the follow-up survey.

Participant # 120

Ms. Greve initially considered option three of the incentive program, but did not accept the offer because she is genuinely satisfied with her water quality. She believes that the incentive offers were fair, but she just does not feel that she needs a system. She supports a voluntary program as plan A, but if owners of pollutant systems fail to respond she recommends that the city enact a mandatory program to prevent long-run environmental damage.

Participant # 201

Mr. Adler owns a portable exchange system and would like to see an incentive program extended to those who own such system that need replacement. He strongly favors the mandatory removal of chloride-based water softeners as long as fair subsidies are given. He suggests that the removal program operate much like high-flush toilet replacement programs. Under such a program, owners of pollutant systems would be given a certain amount of time and a fixed compensatory stipend to comply with the ban.

Participant # 204

Mr. Barsoum owns a chloride-based water softener and considered taking the incentive, but concluded that the monetary offers did not cover the cost he incurred when installing his system earlier this year. While he expressed concern for the environment, he could not afford to remove his current system and replace is with an environmentally friendly system. He supports a voluntary program to remove pollutant systems, and added that increased education would help to curb environmental damage over the course of time. He strongly opposes a regulatory ban on chloride-based softeners, especially if the city government makes the decision unilaterally.

Participant # 205

Ms. Chiang owns a non-chloride-based water softener and would like to replace it with a newer non-chloride-based system in the near future. She explained that her busy schedule did not allow her time to research and purchase a new system before the incentive offers expired. She commented that the stipend amounts were fair, but added that she did not and would not consider incentive offers in the future, because she believes it to be her responsibility to purchase an environmentally friendly system. She supports a mandatory removal program, believing that since the problems affect everyone, the solution should focus on the good of the entire community. However, she adds that a mandatory program should take into account the amount of time someone has owned his/her system and calculate compensatory subsidies accordingly.

Participant # 207

Mr. Chung owns a chloride-based water softener and is very satisfied with his water quality. He did not consider the incentive program because the stipend was insufficient to compensate for his newly installed system. He admitted that the incentive program is a good deal for those with older systems, but adds that the stipend insufficiently compensates those with relatively new systems. For this reason, he strongly supports a

voluntary removal program with fair compensation. He commented that had he known of the environmental hazards prior to purchasing his system, he would have definitely chosen a non-chloride-based softener.

Participant # 208

Mrs. Dennison currently owns a portable exchange system that will soon need replacement. She did not read the incentive letter, so she did not know that stipends were offered, but she commented that she would have seriously considered option three had she been aware of it. She favors a mandatory removal policy for those who own pollutant systems, because the environmental consequences are too serious to delay removal.

Participant # 209

Participant 209 could not be reached to participate in the follow-up survey.

Participant # 212

Mr. Holley owns a chloride-based system and will replace it with a non-chloride system within 2 to 3 years. He strongly considered the incentive program, but did not take the offer because he deemed the stipend insufficient when weighed against the life expectancy of his current system. Mr. Holley adamantly opposes a mandatory removal program, citing a disapproval of excessive governmental intervention. Instead, he favors a voluntary program that would compensate owners the cost of their system minus depreciation. He also favors education programs to inform the public of the environmental damage caused by chloride-based softeners. He asserts that increased awareness would help phase-out pollutant systems over time without intruding on freedoms.

Participant # 213

Ms. Hua owns a chloride-based water softener and seriously considered the incentive offer. However, the stipend failed to cover the cost she invested in her current unit plus the cost of a new environmentally friendly system. She is adamantly opposed to the mandatory removal program because she does not think that people, including herself, will respond will to forceful removal. She further added that she would support a voluntary program as long as fair compensation was given to owners.

Participant # 214

Mr. Kim owns a chloride-based water softener, but following his participation in the focus group he has become very concerned about the environmental consequences of using such a system. He considered the incentive offer but did not accept it because the stipend did not come close to the amount that he invested into his relatively new system. He supports a mandatory removal policy as long as owners received compensation for the cost of their system minus depreciation. He supports the mandatory program because he does not believe that owner of pollutant systems would volunteer, himself included

Participant # 216

Participant 216 could not be reached for the follow-up survey due to a change in the phone number on record.

Participant # 218

Ms. Lewis currently owns a high efficiency chloride-based water softener. The recently installed unit, replaced a previous chloride-based system, and cost approximately $1800. She expressed a sincere concern for the environmental consequences, adding that she would like to switch to a non-chloride-based softener, but could not afford to do so having recently paid for her current system. She stated that she would like to research potential options, but has not had any time to do so. Until she can purchase an environmentally safe system, she is satisfied that her current unit uses significantly less salt than her previous water softener. Ms. Lewis is adamantly opposed to a forced removal, commenting that she would fight any such regulation. Instead she suggests that further education on the dangers of pollutant water softeners would lead to the eventual phase-out of chloride-based systems.

Participant # 220

Ms. Saggar owns a portable exchange unit and is concerned by the potential consequences of using chloride-based water softeners. She did not return the general survey because, as a college student, she has been too busy taking summer courses. She supports a mandatory removal policy because she is certain that the public would not take a voluntary program seriously. Therefore, she concludes the city should ban chloride-based softeners in order to protect the environment and public health.

Participant # 223

Mr. Thurbin owns a reverse osmosis system in his kitchen, and would not consider purchasing any additional systems. He reported that Culligan has been soliciting in his area with a very low cost promotion to install chloride-based softeners. He expressed concern over the potential environmental hazards. He supports a mandatory removal policy, as long as owners are given adequate time for removal and just compensation. He also added that the city should negotiate with suppliers (i.e. Culligan) to promote and sell only non-chloride-based water softeners.

Participant # 225

Mr. Whittenberg owns a non-chloride-based water softener. He supports a voluntary removal program that would provide fair compensation. He opposes a mandatory program, citing the difficulty of enforcing and overseeing a ban.

Participant # 226

Participant 226 could not be reached for the follow-up survey due to a disconnected phone line.

Participant # 228

Participant 228 could not be reached to participate in the follow-up survey.

Participant # 301

Participant 301 could not be reached to participate in the follow-up survey.

Participant # 302

Mr. Beaumont does not own a water softener and would not consider purchasing a system because he is currently satisfied with his water quality. Despite our records, He reports returning the general survey. He adamantly supports a mandatory removal program, because he is convinced that the environmental hazards warrant a ban on pollutant systems.

Participant # 304

Mr. Davis does not own a softener and does not intend to purchase a unit. Contrary to our records, he reported returning the questionnaire. He believes that a time limit should be places on any voluntary program, which would eventually give way to a mandatory policy.

Participant # 305

Mr. Garside did not remember participating in the focus group until mention of the $150 the he received. Despite being reminded of his agreement to participate in a follow-up phone survey, he refused to answer any questions citing a lack of interest and time.

Participant # 307

Ms. Hernandez does not own a water softener and does not intend to purchase a system because she is a renter. In regards to a removal program, she supports a mandatory policy, because she does not believe that enough owners would voluntarily remove their systems, nor does she believe that a voluntary program could provide sufficient oversight to ensure that volunteers actually removed their pollutant systems.

Participant # 308

Ms. Hilgemann does not own a water softener and does not intend to purchase a system. She is very concerned for the environment and would like to see a ban on chloride-based softeners, because she believes that a voluntary program will fail to register significant compliance. She suggests that the ban be incorporated into city building codes and that an education program be established to inform the public of the dangers of pollutant systems.

Participant # 310

Mr. Corey does not own a water softener and is not interested in purchasing a unit, because he is currently satisfied with his water quality. He supports a voluntary removal program because he does not believe that the environmental problems are very serious. He stated that he questions whether chloride-based systems are the sole contributors on salt in reclaimed water.

Participant # 311

Participant 311 could not be reached to participate in the follow-up survey.

Participant # 312

Participant 312 could not be reached to participate in the follow-up survey.

Participant # 315

Participant 315 could not be reached to participate in the follow-up survey.

Participant # 316

Participant 316 could not be reached to participant in the follow-up survey.

Participant # 317

Participant 317 could not be reached to participate in the follow-up survey.

Participant # 318

Participant 318 could not be reached to participate in the follow-up survey.

Participant # 319

Ms. DeKlotz does not own a water treatment system and does not intend to purchase a unit, as she is satisfied with water quality. Following the focus group, she is convinced that a mandatory ban on chloride-based softeners is necessary. She does not believe that owners of pollutant systems will voluntarily remove their softeners, and since tax payers must pay for the environmental damages caused by the very few, she supports regulation mandating removal of pollutant systems.

Participant # 320

Participant 320 could not be reached to participate in the follow-up survey.

Participant # 401

Participant 401 refused to participate in the follow-up survey, citing a disinterest with the study.

Participant # 402

Participant 402 could not be reached to participate in the follow-up survey.

Participant # 404

Mr. Chapman does not own a water softener and does not intend to purchase a system, as he is satisfied with his current water quality. He does not believe the public will simply accept a mandatory removal policy, but concedes that a voluntary program will probably accomplish little. While he is suspicious of the severity of the environmental problems, he nonetheless feels the hazards warrant a ban on chloride-based softeners.

Participant # 408

Participant 408 could not be reached to participate in follow-up survey.

Participant # 410

Ms. Fisher adamantly supports a mandatory removal program. She does not believe that owners of pollutant systems will cooperate with a voluntary removal policy. She is certain that the environmental damage caused by chloride-based softeners will eventually necessitate a law banning usage in the IRWD.

Participant # 412

Participant 412 refused to take part in the follow-up survey, citing disinterest and a lack of time.

Participant # 413

Participant 413 could not be reached to participate in the follow-up survey.

Participant # 414

Participant 414 could not be reached for the follow-up survey due to a disconnected phone-line.

Participant # 416

Participant 416 could not be reached to participate in the follow-up survey.

Participant # 417

Mr. Park does not own a water softener and would not purchase a system, as he is satisfied with his water quality. In regards to a removal policy, he states that he would prefer a voluntary program, but realistically does not believe such a program would be successful. Therefore, he hesitantly supports a mandatory program, believing environmental concerns warrant a ban.

Participant # 418

Participant 418 could not be reached to participate in the follow-up survey.

Participant # 419

Participant 419 could not be reached to participate in the follow-up survey.

Participant # 420

Mrs. Scrivner owns a portable exchange unit. She is convinced that a voluntary program will be unsuccessful, unless the incentive is unrealistically high. Convinced that the environmental concerns are urgent, she timidly supports a mandatory removal of pollutant systems.

Participant # 421

Mr. Taghiei owned a chloride-based system prior to his participation in the focus group, but based on the information he received during the session, he decided to remove his system. Despite removing his system, he inexplicably neglected to collect the incentive, though he commented that he would now like to receive the stipend if possible. In regards to a removal policy, he would like to see the city attempt a voluntary program before committing to a ban on pollutant systems. Should the voluntary program prove unsuccessful, he reports that he would wholly support a mandatory removal program.

Participant # 422

Participant 422 could not be reached to participate in the follow-up survey.

Participant # 423

Participant 423 could not be reached to participate in the follow-up survey.

Participant # 424

Participant 424 could not be reached to participate in the follow-up survey.

Participant # 425

Participant 425 could not be reached to participate in the follow-up survey.

Participant # 426

Participant 426 could not be reached to participate in the follow-up survey.