

**The Public Perception of Drinking Treated Groundwater from the
Massachusetts Military Reservation, Cape Cod, MA**

by

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Submitted to the Department of Civil and Environmental Engineering in Partial
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Abstract

To halt the further migration of the plumes emanating from the Massachusetts Military Reservation (MMR), a containment system is currently under design to extract large amounts of water from the aquifer. During the early stages of the design process, discussions were held as to the beneficial reuse of some of this extracted water including additions to the municipal water supply. This idea was rejected, however, due to the lack of public acceptance to drinking treated groundwater. In the near future it may become necessary to use treated water. Therefore, the reasons behind this public perception were investigated through interviews and public meetings. Concurrently, suggestions and information for an educational program to address these perceptions were also collected. Finally, additional interviews were conducted to investigate the ways in which information about the MMR is distributed by the local groups to the general public. Their sources of MMR information and extent of their public audience were also investigated. These results were used to suggest a way in which to implement an educational program in this community through the local groups.

There are four main reasons behind the lack of public acceptance to drinking treated groundwater: (1) Cape Cod residents have come to expect pristine water sources; (2) Local residents believe that the water from the MMR would not be treated to non-detect levels of contaminants; (3) The residents do not fully trust the MMR; and (4) The public would prefer that the water superintendents continue to search for new locations to drill water supply wells as long as this option remains viable. To address these perceptions, an educational program should: (1) Provide examples of other communities that use treated water; (2) Explain that the carbon treatment system can remove contaminants to non-detect levels; is redundant to prevent breakthrough; and is monitored to maintain non-detect levels; and (3) Show that the treated water is necessary because of the high costs of land and drilling for new wells and the unavailability of land.

The primary source of information about the MMR to the local groups is through the MMR itself in the form of citizen committees, public meetings, and the site mailing list. The local groups, in turn, distribute information primarily through the use of their own regular newsletters. The regional, environmental groups constitute the largest constituency with the greatest resources; hence, their activities are the most far-reaching. In order to implement an educational program through the local groups, a simple format should be used that can be distributed through their regular newsletters; newsletters reach virtually all of the members of the local groups. The MMR could supply information to the local groups through citizen committees; most of the groups have members which serve on these committees. Lastly, if resources were limited, the regional, environmental groups should be targetted because they have the largest membership; are very active within the community; and have greater resources than the other types of local groups.

Thesis Supervisor: David H. Marks

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1. Introduction

The Massachusetts Military Reservation (MMR), located on Cape Cod, MA, has experienced a long history of military activities. These activities have left their mark on the area as large plumes of contaminated groundwater emanate from the reservation. [Figure 1-1. Stone & Webster. September, 1995] The plumes contain several types of contaminants including: tetrachloroethene (PCE), trichloroethene (TCE), ethylene dibromide (EDB), benzene, and several others. The four towns surrounding the MMR – Bourne, Falmouth, Mashpee, and Sandwich (Upper Cape) – have been most affected by the migration of the plumes. [Figure 1-2. Stone & Webster. September, 1995] Municipal and private water supply wells have closed, property values have declined, and concerns have arisen over the effects of the plumes on local ponds and ecosystems.

Under the direction of the MMR's Installation Restoration Program (IRP), a containment design is currently underway to halt the further migration of the plumes. The design includes extraction of the contaminated groundwater; treatment to remove contaminants to meet drinking water standards; and subsurface reinjection of the treated water into the aquifer. During the early stages of the design process, alternative uses for the treated water besides reinjection were examined. These other uses are called beneficial reuse options and were evaluated by the IRP's design consultant, Operational Technologies Corporation, according to effectiveness, feasibility, and cost. The three

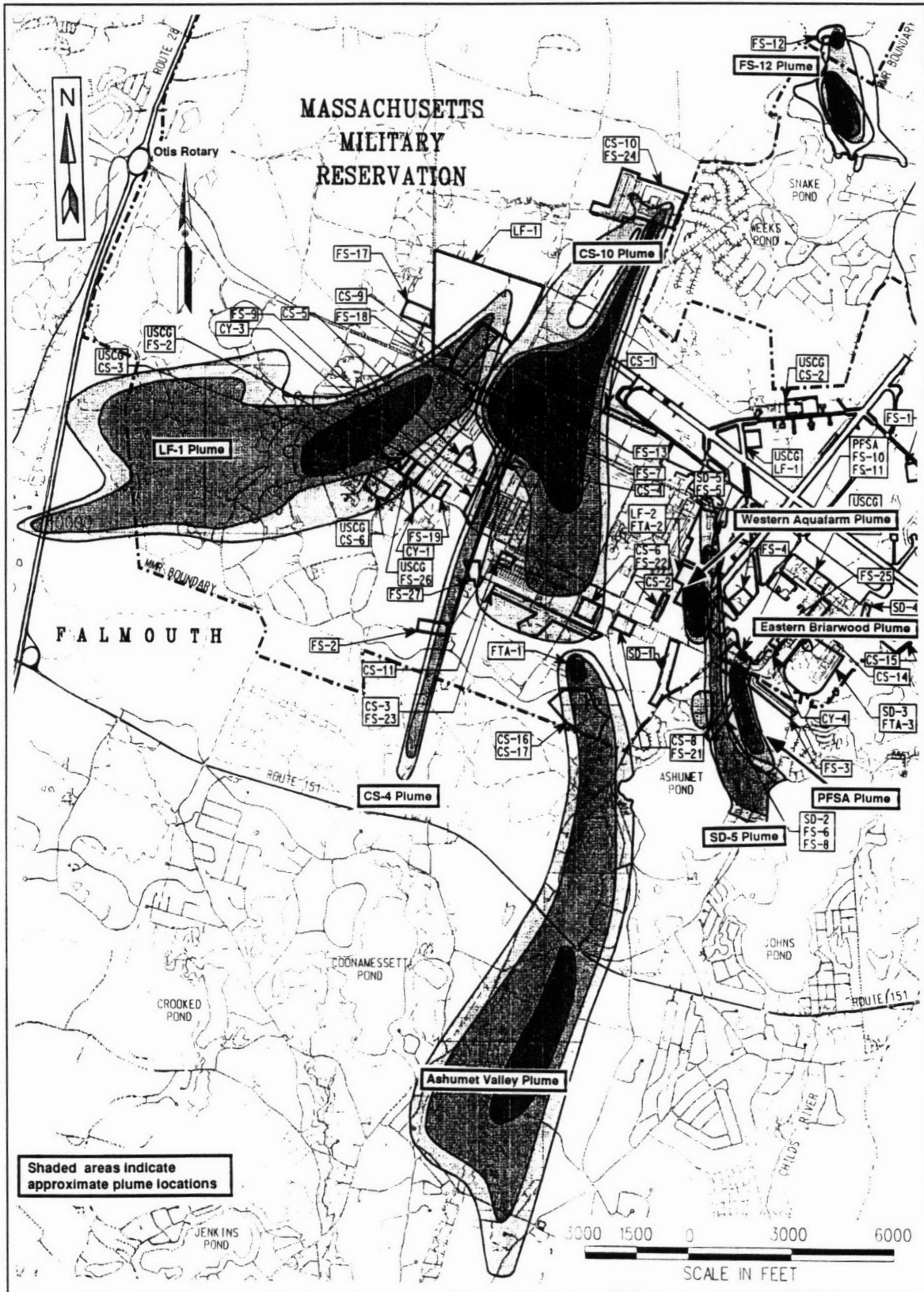


Figure 1-1. MMR Site Map of Groundwater Contamination

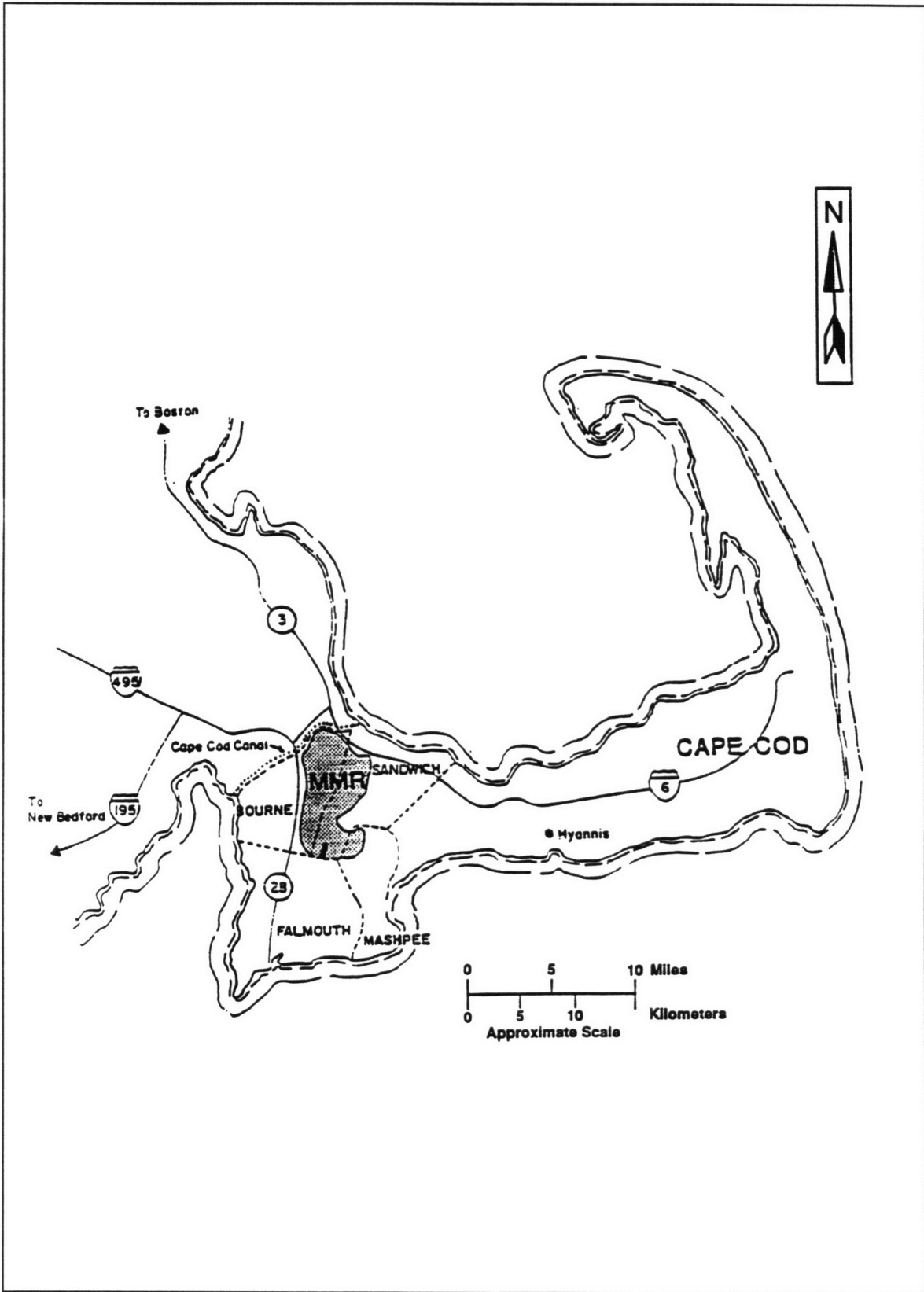


Figure 1-2. Location of MMR in Relation to the Four Surrounding Towns

best options according to these criteria included surface discharge to ponds, irrigation and agricultural use, and additions to the municipal water supplies for the four surrounding towns. [Operational Technologies Corporation. July, 1995]

A unique feature of this site is the extensive community input allowed in the decision making processes of the IRP. The IRP has organized several committees each of which focuses on a different aspect of the plume containment design. The beneficial reuse options were reviewed by joint meetings of two such committees: the Long Range Water Supply Process Action Team (LRWS PAT) made up of the local water district superintendents from the four towns; and the Program Implementation Team (Team 2) comprised of members of local community groups, concerned citizens, and Cape Cod Commission representatives.

The recommendation made by the joint committee rejected all beneficial reuse options and included 100% reinjection of the treated water into the aquifer. The committee cited the lack of public acceptance to drinking treated groundwater as the main reason behind their recommendation. These towns have historically used “pristine” sources of water which are considered to be very clean. In addition, the committee recommended that if treated water needs to be used in the future, educational programs must be implemented to increase public acceptance of this idea. The recommendation in its entirety is included in Appendix A. [Pesce. July, 1995] [Note: Little of the conversation focused on the other two beneficial reuse options, recharge to ponds and irrigation. Reuse for drinking water was the committee’s primary concern and subsequently will be the singular focus of this study.]

1.1 Motivation

The lack of public acceptance to drinking treated groundwater is problematic. The use of treated groundwater may become an option for the surrounding water districts of Falmouth, Bourne, Sandwich, and Mashpee as more of their water supplies are affected by the contamination. To date, Falmouth has lost several of its wells to contamination, the Ashumet Valley well in 1979 and the Coonamessett well in February 1996; Bourne has lost Wells #2 & #5. The LRWS PAT, made up of the four water district superintendents, is responsible for ensuring that their districts have sufficient supplies to meet demands until the year 2020. Currently, they are predicting a shortfall, most drastically for Falmouth and Bourne. [LRWS PAT, 1994] This shortfall can be avoided if new wells are drilled to replace those lost to contamination. Unfortunately, new sources of water have become more difficult to establish due to the lack of land availability and high well construction and land costs. Therefore, the use of treated water may need to be considered by these water districts whether it is treatment of the water from their own contaminated wells or treated water from the MMR. Falmouth is currently considering treatment of the Coonamessett well to supplement their water supply. The lack of public acceptance to drinking treated groundwater will be an issue for the town to address.

1.2 Scope

The primary reason for the downfall of using treated water from the MMR is the negative public perception of this idea. However, treated groundwater is used in many

parts of the United States, is treated to drinking water standards, and may be needed in the near future by the surrounding towns. This is the reality of the situation. However, for the purposes of implementing the use of treated groundwater in the Upper Cape, perception *is* reality. Therefore, this study accomplishes four objectives to address these perceptions:

- Discern public perception about drinking treated groundwater from the MMR;
- Investigate and provide information to include in educational programs to address these public concerns;
- Outline the pathways by which information is distributed throughout the community;
- Suggest ways in which to implement such educational programs through the information pathways.

Note: Although this study focused only on the perceptions surrounding the treatment of water from the MMR, most of these findings are generally applicable and non-specific. The findings can be broadly used to address public perception issues surrounding water treatment.

2. Standards of Water Supply Quality

Standards of water supply quality enter into any discussion of the treatment of water. In order to compare the Upper Cape's pristine water with the MMR's treated water, it is important to understand the ways in which water quality are characterized. Two standards used frequently are Maximum Contaminant Levels and non-detect levels.

2.1 Maximum Contaminant Levels (MCLs)

All drinking water sources must meet standards called Maximum Contaminant Levels or MCLs. These levels represent the maximum concentration of contaminants allowed in drinking water. MCLs are primarily mandated by federal law; however, more stringent state laws can be promulgated. The MCLs for the contaminants referred to in this study are listed in Table 2-1. MCLs are listed in parts per billion (ppb), equivalent to a $\mu\text{g/L}$.

Table 2-1. Federal and State Maximum Contaminant Levels

Contaminants	Federal MCL (ppb)	Massachusetts MCL (ppb)
Dichlorodifluoromethane	none	none
1,1-Dichloroethane	none	none
1,1-Dichloroethene	7	7
Ethylene dibromide (EDB)	.05	.02
Tetrachloroethene (PCE)	5	5
1,1,1-Trichloroethane	200	200
Trichloroethene (TCE)	5	5

From: Operational Technologies Corporation. January, 1996.

2.2 Non-detect Levels (ND)

A non-detect level (ND) refers to the lowest concentration of a contaminant that can be detected with analytical instruments. Therefore, ND levels reflect the detection limits of measurement devices. Note that ND does not mean that the concentration of a contaminant is zero; it simply refers to the lowest level of contamination a machine can measure.

3. Public Perception

Public perception plays an important role in decisions concerning the use of treated water. In the case of the MMR, these perceptions resulted in its rejection. However, Falmouth may begin to use treated water soon. Therefore, it is important to investigate the local sentiment surrounding treated water use in order to address their concerns.

The public perceptions of drinking treated water were discerned from three sources: meeting minutes from the beneficial reuse discussions; interviews with the members of the LRWS and Team 2 Committees; and recent public meetings.

✧ Joint Meeting Minutes

Discussions of the public perception surrounding the use of treated water originated with the joint LRWS/Team 2 Committee on beneficial reuse options. The minutes from these meetings allude to several public concerns about drinking treated groundwater. See *Meeting Minutes, Team #2 and LRWS PAT* for a detailed record of these discussions.

✧ Interviews with LRWS and Team 2 Members

In order to further investigate these concerns, interviews were conducted with six of the members of this joint committee. The interviews were informally conducted in person or by telephone. Each individual was asked the following question:

What do you think are the main reasons behind this lack of public acceptance to drinking treated water from the MMR?

✱ Public Meetings

Other concerns were collected by attending meetings organized by the IRP at which the general public was in attendance. These meetings included the Falmouth Public Meeting, February 1996; the 58th Technical Environmental Affairs Committee (TEAC), January 1996; and several Team 2 meetings throughout January & February 1996.

3.1 Results

The results from these three sources are presented below. The information is organized into four main reasons for the lack of public acceptance to drinking treated groundwater. The “public” includes water district superintendents, local officials, Cape Cod Commission representatives, members of local community groups, and the general public. In no way are the reasons meant to be exclusive of one another; in reality, several of the reasons are interrelated. However, this organization facilitates easier discussion and comprehension of the major issues inherent to each reason.

❖ Cape Cod residents have come to expect pristine water sources.

Cape Cod residents are not accustomed to drinking treated groundwater. Bourne, Mashpee, and Sandwich use water directly from the aquifer after pH adjustment. They do not disinfect the water through chlorination. Therefore, using treated water is a greater change for the people of Cape Cod than for other areas of the country. Historically, there is a great amount of tradition behind Cape Cod’s pristine water as evident in these individual’s remarks:

People come to Cape Cod because they have a love for the environment and good drinking water. We expect this quality of life on Cape Cod as part of our standards. For city people, treated water is O.K. But we're on Cape Cod. [Personal Communication, Susan Walker. April, 1996]

Acceptance may be denied because the standards for people who have lived on Cape Cod most of their lives know what good drinking water is. [Meeting Minutes. July 6, 1995]

It's an emotional reluctance rather than anything based on fact. [It's the attitude that] I'm a Cape Cod resident and I have a history and I don't want to break from that. [Personal Communication, John Latawic. April, 1996]

Therefore, Cape Cod residents have a tradition of clean water and are not accustomed to drinking treated water. One interviewee summarized the idea succinctly: Cape Cod has "no history of public acceptance of treated water". [Personal Communication, John Latawic. April, 1996]

❖ **Local residents believe that the water from the MMR would not be treated to non-detect (ND) levels of contaminants.**

The communities will accept nothing less than ND levels of contaminants in treated water:

There is a difference in public acceptability between water that has been treated to below MCLs and water with no detectable contaminants. The public would not accept water with any detectable contaminants. [Meeting Minutes. July 13, 1995]

The MMR, with its planned carbon treatment facility, can technologically reach ND levels. However, under its agreement with the DoD, the MMR cannot legally guarantee these levels. Therefore, the community sees this water as "cleaner, polluted water" and

feels that the water would not be treated to ND levels: “People didn’t want to drink water with levels just under MCLs. [The water] still has contaminants in it.” [Public Meeting Participant. February, 1996; Personal Communication, Gabrielle Belfit. March, 1996]

In support of these sentiments, a number of individuals at public meetings feared that they would be drinking water that was just below MCLs. For example, one individual feared that if the MCL was set at 5 ppb and the water measured 4.9 ppb it would be used for drinking water. In addition, they distrusted the carbon treatment system and feared that if it experienced “breakthrough”, contaminated water would go directly through the facility without treatment, and they would be drinking contaminated water. Breakthrough occurs when the carbon within the treatment facility is “used up” and can no longer remove contaminants from the water.

❖ **The residents do not fully trust the MMR.**

The relationship between the local residents and the MMR continues to be strained. From the early years of the project, there are many lingering memories of being misinformed and misled by the MMR. Public sinicism and skepticism of the MMR continues. These feelings are often enhanced and perpetuated because the containment design leaves many questions to be answered. The IRP often cannot answer the most important questions with a high degree of certainty or clarity:

- What are the ecological impacts of pumping so much water out of the aquifer to contain the plumes?
- Why does the current design pump twice as much water as the old design?
- Why have you changed from double to single-walled piping?

When clear or exact answers to questions are not be given, the public believes that the MMR officials are misleading them or do not know the answers themselves.

In relation to drinking water issues, they are being told that the water is safe to drink by the same establishment that told them years ago not to worry about the contamination. This sentiment hinges on the past history of relations between the public and the MMR; and the continuing and often vague answers to their questions.

- ❖ **The public would prefer that the water superintendents continue to search for new locations to drill water supply wells as long as this option remains viable.**

According to Ralph Marks, Water Superintendent of Bourne, the residents in his town have encouraged him to keep searching for new locations to drill wells. Currently, Bourne is looking for new locations on the north side of the MMR. He stated, “Treated water would be a very hard sell to the public when there are clean sources of drinking water available”.

3.2 Conclusion

As evidenced by these interviews, the lack of public acceptance to drinking treated groundwater is multi-faceted. There are technological, political, and social issues which combine to create these public perceptions. This negative sentiment is based on four main ideas: (1) The pristineness of Cape Cod water; (2) Distrust in the carbon treatment system; (3) Poor relations with the MMR; and (4) The belief that other pristine water sources are available.

4. Educational Program

As part of their final recommendation, the joint committee suggested that if water reuse was to be considered in the future, public education programs would need to be implemented in order to increase the public acceptance of drinking treated groundwater. Currently, the only water district manager who is willing to use treated water from contaminated sources is Raymond Jack of Falmouth. In his interview, he pointed out that Falmouth is already using treated water from a local surface water body, Long Pond. This water, although not from a contaminated site, is treated with chlorine for disinfection purposes. In the future, as demand continues to grow over supply, using treated water may become an option. Falmouth is currently considering treatment of the Coonamessett well which was closed because of its proximity to one of the MMR plumes. Educating the public about treated water will be an issue for the Falmouth Water District to address before treated water from the well is used.

In response, the same individuals from the LRWS and Team 2 Committee were also asked the following question to obtain their suggestions for information to include in an educational program:

What information do you think is important to explain to the public through educational programs to increase their acceptance of drinking treated water?

4.1 Results

Not surprisingly, their answers reflected many of the public perceptions described in the first part of this study. Correspondingly, each suggestion was matched with the public perception it best addressed. Again, some of these suggestions are not exclusive to a particular perception; they are categorized in this manner for the purpose of easier discussion.

❖ Cape Cod residents have come to expect pristine water sources.

Interviewees suggested providing as many examples as possible of other communities that use treated water. Many Cape Cod residents do not realize that using treated water is commonplace across the country. Barnstable, MA, located on Cape Cod, would be a great example because it is literally right next door. This community of Cape Cod residents *has* accepted the use of treated water.

❖ Local residents believe that the water from the MMR would not be treated to non-detect (ND) levels of contaminants.

Numerous suggestions were given to address this perception. Most of them related to the public's misunderstanding and subsequent distrust of the carbon treatment systems. In order to allay their fears, the following suggestions were given:

- Explain that the treatment system is effective and will bring contaminant levels down to ND;
- Cite numerous examples of other places which use carbon treatment with similar contaminants present in the water;

- Explain that the carbon treatment system is redundant meaning that if one carbon filter “breaks through” the second filter will prevent contaminated water from simply passing through the system with no treatment;
- Assure people that the water will be monitored to ensure that ND levels are maintained.

Fifth, and perhaps most difficult, was the suggestion that the public needs to understand how the standards of water quality are determined. Interviewees believed that if the public could understand this issue, they would be less preoccupied with whether or not the water was at MCLs or ND. MCLs are set by a “stroke of the pen” by legislators who may establish levels politically rather than scientifically. An MCL may not reflect any evidence of carcinogenicity or harm to humans. ND levels are set by the detection limits of analytical devices for detecting contaminants. Therefore, with advances in technology and improvements in analytical devices, “What is clean today may no longer be clean tomorrow.” [Personal Communication, Raymond Jack. March, 1996]

❖ **The residents do not fully trust the MMR.**

Although none of the individuals gave suggestions for this perception, it is obvious from attending public meetings that the public wants honest and clear answers to their questions. Often questions are not answered directly or simply enough. Hence, the IRP comes across as intentionally misleading the public.

- ❖ **The public would prefer that the water superintendents continue to search for new locations to drill water supply wells as long as this option remains viable.**

One interviewee suggested that the public may be more accepting of treated water if they could understand the need for it in the future. Two current issues facing Falmouth are the high costs of land acquisition and drilling new wells, and the unavailability of land. Therefore, if the public could be shown that high costs or land unavailability made it necessary to use treated water, they would be more accepting. In support of this notion, another interviewee stated that an incentive for some residents to accept treated water might be the cost of water.

4.2 Information for an Educational Program

Many of the suggestions given by the interviewees require more than a brief explanation. A number of the suggestions were further researched to provide accurate and detailed information for an educational program. Specifically, this information addresses three suggestions:

- Provide examples of other communities that use treated water;
- Explain that the carbon treatment system can remove contaminants to ND levels; is redundant to prevent breakthrough; and is monitored to maintain ND levels;
- Show that the treated water is necessary because of the high costs of land and drilling for new wells, and the unavailability of land.

4.2.1 Treated Water Use

Many areas of the United States use treated water as a drinking water source. For this study, the most interesting example of water reuse is the treatment facility in Barnstable, MA. Barnstable is located due east of the towns surrounding the MMR, and is successfully treating many of the same contaminants in their water that are found in the groundwater plumes from the MMR. [Figure 4-1. Department of Environmental Management. October, 1994]

Instead of searching for sites to drill new wells, Barnstable has chosen to treat water from three existing wells called the Maher wells. These wells are very productive for Barnstable, providing a capacity of 2100 gallons per minute (gpm) or a little over 3 million gallons per day. During the off-season months (September - May), these wells provide Barnstable with 80% of their water; during the in-season months (June - August) with the flood of tourists and summer residents, they provide 20% of their water.

The contaminated groundwater in Barnstable is the result of two separate operations. At the nearby airport, degreasers containing volatile organic compounds (VOCs) were used for aircraft engine maintenance. The VOCs which are present in the groundwater include: tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene (DCE), 1,1,1-trichloroethane, and 1,1-dichloroethane. The groundwater also contains dichlorodifluoromethane, better known as freon-12, from years of overuse and mishandling by a local company. It is highly suspected that significant quantities of freon-12 were dumped into a nearby pond. [Personal Communication, Norman Nalt. April, 1996]

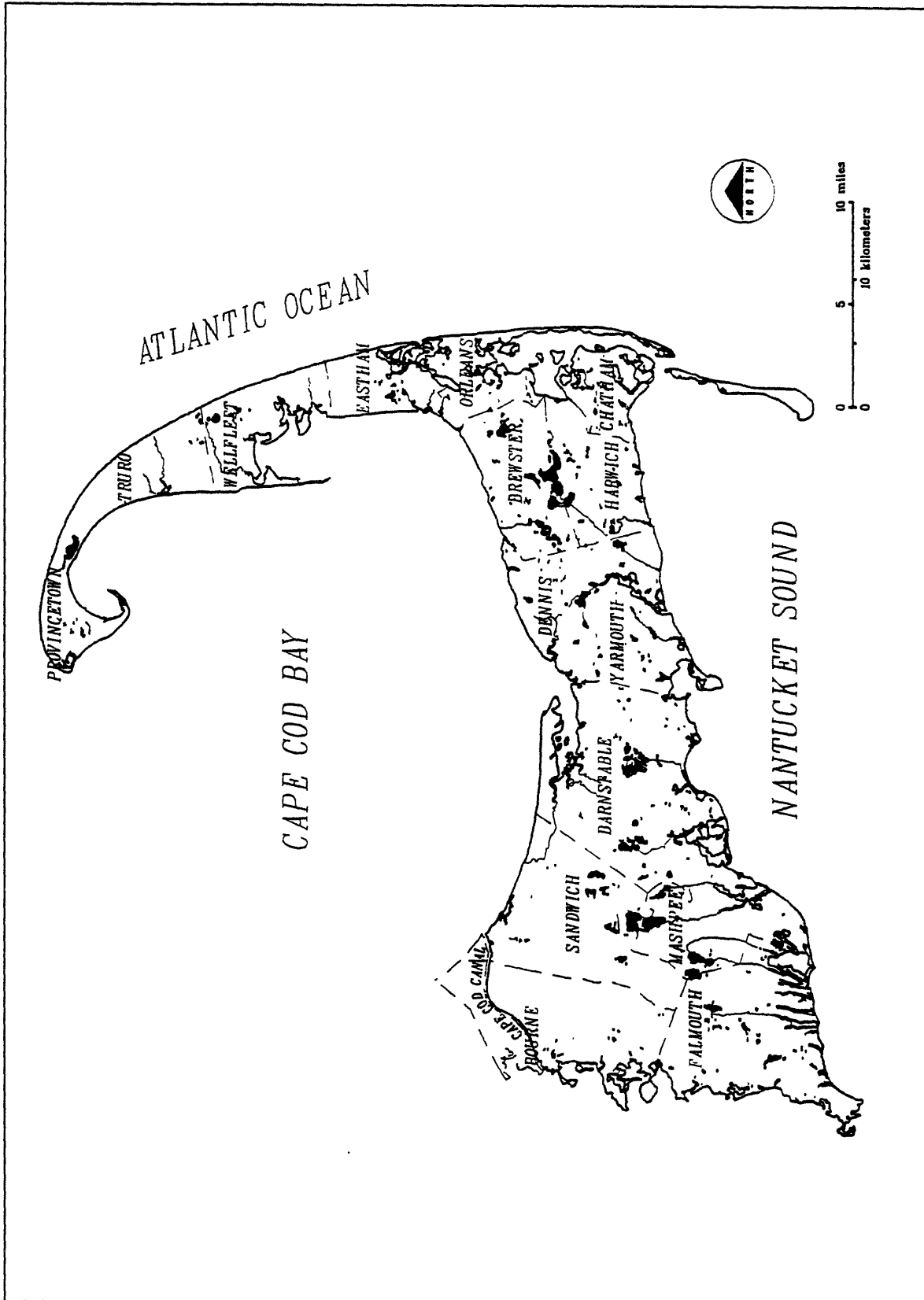


Figure 4-1. Location of Barnstable in Relation to the Four Surrounding Towns

In order to remove the contaminants from the groundwater, Barnstable uses an air stripper on their existing wells. To date, the resultant water has ND levels of contaminants. The public has also been fairly accepting of the idea of reusing contaminated water for the municipal water supply. To date, the only significant public concern has been the chlorination of the water. Otherwise, the system is also a success in this venue. This facility represents just one of many examples nationwide of successfully treating groundwater for use as a drinking water source.

4.2.2 Water Treatment Systems

One commonly used method for the treatment of contaminated water is granulated activated carbon (GAC). The carbon sorbs the contaminants, removing them from the water. Water leaves the treatment unit well below MCLs. The MMR is planning to use such treatment units. At the leading edge of each plume being contained under the current design (Ashumet Valley, CS-10, Eastern Briarwood, SD-5, FS-12, and LF-1), an extraction fence will pump contaminated water out of the aquifer. According to the design, this water will be transferred to treatment units which will treat the water to MCLs. In general, these treatment units contain a greensand filtration section to extract metals from the water, and a carbon filtration system to remove VOCs. The typical layout of a treatment unit is shown in Figure 4-2, "CF" denoting carbon filtration and "GS" denoting greensand. [Operational Technologies Corporation. February, 1996] As illustrated in the figure, there are two carbon filtration units. Contaminated water enters the first filtration unit, is treated to MCLs, and transferred to an interim pipeline between

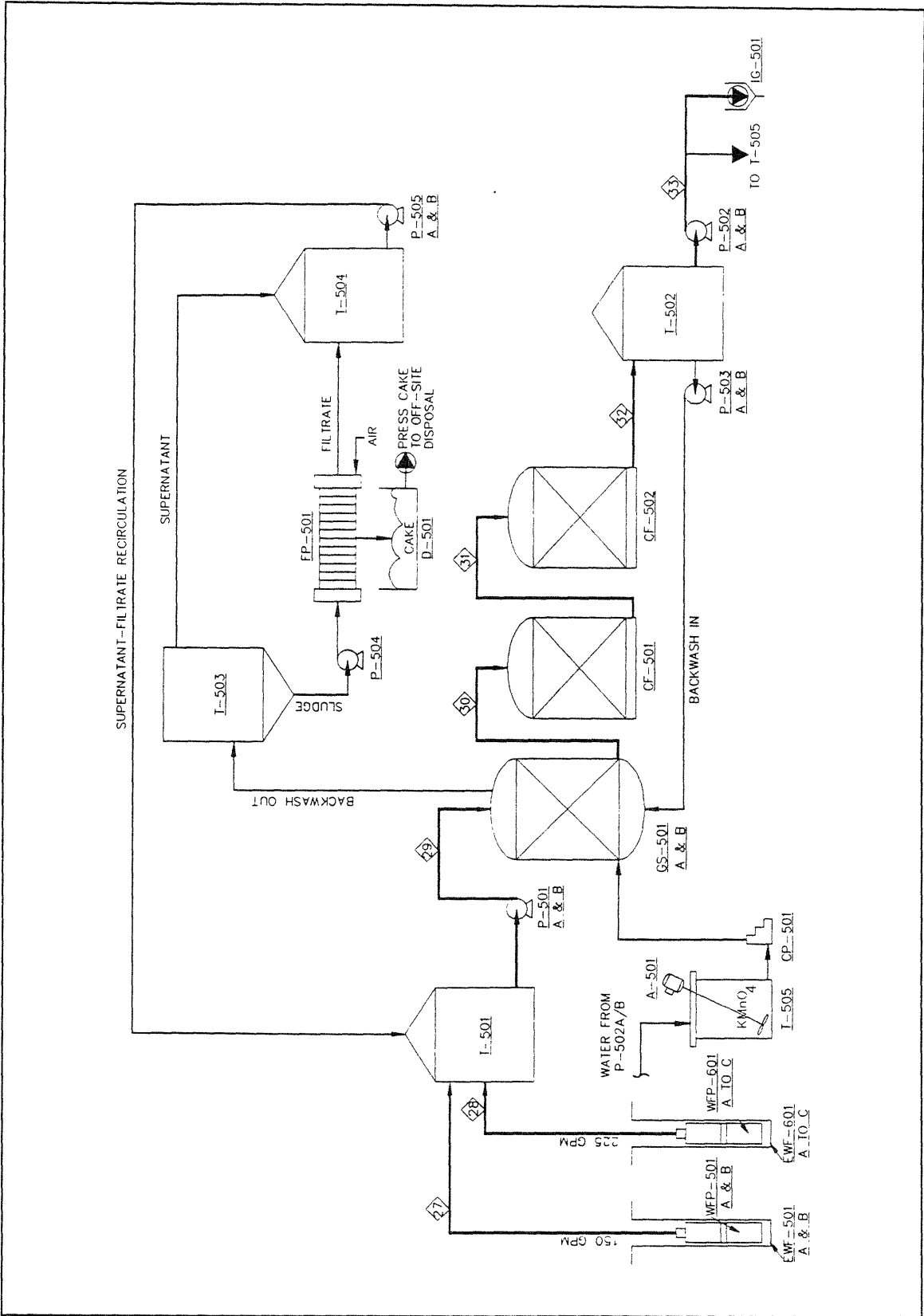


Figure 4-2. Carbon Treatment System

the two units. At this point, the water is monitored to verify that MCLs have been met. The water then proceeds to the next carbon filtration unit in which it is further and equally treated. This type of system is referred to as a “redundant system” and affords the notion that water exiting the treatment unit can actually be treated to well below MCLs. In actuality, the water is expected to be very close to or at non-detect (ND) levels of contaminants; however, the National Guard Bureau (the lead agency in charge of the remediation of the MMR) under its contract with the DoD cannot legally guarantee this level of treatment. They can only guarantee that the water will meet MCLs. [Personal Communication, Martin Aker. January, 1996] Nonetheless, the resultant water will, in practice, be very clean with the designed system.

4.2.3 Cost of New Wells and Unavailability of Land

To install a new well, the combined cost of acquiring land and drilling is approximately \$2 million; installing well head treatment on an existing well costs approximately \$650,000. [Personal Communication, Raymond Jack. March, 1996] Treatment of existing wells is three times cheaper than drilling a new well.

Furthermore, in order to drill a new well in a pristine area, land must be acquired. However, the present development of the Upper Cape area may create difficulties in acquiring land. Falmouth currently does not have sufficient land available on which to drill new wells to meet its shortages. Bourne has resorted to drilling on MMR property north of the location of the plumes. However, little is known about the history of this part

of the MMR. Extensive tests have not been done to investigate whether contamination also exists in this area. Therefore, Bourne may have to search elsewhere to find new land areas.

4.3 Conclusion

Through an educational program, it is possible to allay many of the public perceptions against the use of treated groundwater. A good portion of their perception can be addressed by providing them with information about the common use of treated water and the reliability of carbon treatment; and the future necessity of treated water particularly in Falmouth. Accordingly, an appropriate educational program may be designed by using the information provided in this study.

5. Flow of Information and the Role of Local Groups

A well planned educational program is essential to informing a broad, public audience. However, appropriate implementation of the program is a very important step between designing an educational program and informing the intended audience.

The MMR has a very active interaction with its surrounding community through the IRP Office. Through their Joint Public Involvement Community Relations Plan (Plan), the IRP informs the public in numerous ways. However, the effectiveness of the Plan in directly communicating information to the general public is questionable:

Many of the people emphasized that large public meetings and forums as arranged [by the IRP] in the past have discouraged many citizens from participating and have not been productive. Many of these people believe that involvement through local community associations would be more productive. [Joint Public Involvement Community Relations Plan. September, 1995]

Additionally, this statement suggests the important role the local groups play in indirectly distributing information about the MMR to the general public. They serve as an important link between the MMR and the wider community.

Correspondingly, the pathways in which information about the MMR passes from the local groups to the wider public were investigated. First, the Plan was outlined to establish the different ways in which the IRP distributes information about their activities. Second, local groups were interviewed to determine the importance of the Plan as a source of information about the MMR. Concurrently, the local groups were also

interviewed to determine how they, in turn, distribute information they have received about the MMR to the general public. Finally, the extent of each local groups' audience and activities was determined in order to design an appropriate way in which to implement the educational program.

5.1 Joint Public Involvement Community Relations Plan

In order to inform and involve the public in the remediation of hazardous waste sites, the Department of Defense (DoD), through the IRP Office, and the Environmental Protection Agency (EPA), under its Superfund jurisdictions, develop Community Relations Plans (CRP). At the state level, the Massachusetts Department of Environmental Protection (MDEP) develops similar plans, called Public Involvement Plans (PIP), upon request from the public in the form of a petition. In 1989, the MDEP was requested to develop a PIP for the MMR by the Upper Cape Concerned Citizens. Therefore, the Joint Public Involvement Community Relations Plan (Plan) represents a combined effort of the DoD, EPA, and MDEP to create a document to outline ways in which to disseminate information and involve the public at the MMR site:

the activities . . . are designed to inform interested citizens and local officials about the programs of remedial activities and to provide opportunities for the public to be involved in planning remedial actions at the MMR. [Installation Restoration Program. September, 1995]

At the MMR, the Plan is managed by the IRP. Public involvement activities are designed to involve the surrounding towns of Bourne, Falmouth, Mashpee, and

Sandwich. Outlined below are some of the activities organized by the IRP to promote communication with the public. The “public” refers not only to the general population but also to local officials such as selectmen and water district superintendents, members of local community groups, and Cape Cod Commission representatives.

✧ *Environmental Update* / Site Mailing List

The site mailing list is used to distribute information such as the *Environmental Update*, dates of meetings, news releases, etc. There are approximately two thousand people on this list. The *Environmental Update* is generated by the IRP to present information in non-technical terms concerning the containment design, upcoming drilling activities, property access issues, and other items of public concern. It also provides telephone numbers for IRP and local contacts, and addresses of the local libraries at which information about the MMR can be found. It is published every other month and serves to update the public about current issues.

✧ Citizen Committees

As mentioned earlier, the IRP has organized several committees to provide input on different aspects of the containment design. These committees serve not only to involve the public within discussions about current issues at the MMR, but also serve to inform the public at many levels from selectmen to average citizens. They, in turn, distribute the information to a broader, public audience. Their phone numbers are circulated through the *Environmental Update* to encourage the general public to call committee members for information. Briefly outlined below are the names of the committees, their function, and their local, public membership:

❖ Senior Management Board (SMB)

- ◆ Makes final recommendations for the design of the containment system; Bases recommendations on issues brought before them from the other committees
- ◆ Selectmen - Bourne, Falmouth, Mashpee, Sandwich

❖ Long Range Water Supply Process Action Team (LRWS PAT)

- ◆ Makes recommendations to ensure adequate future water supplies for the Upper Cape
- ◆ Water District Superintendents, Cape Cod Commission Representatives

❖ Plume Containment Team (Team 1)

- ◆ Reviews and discusses issues concerning the design of the plume containment system
- ◆ Local Group Members, Cape Cod Commission Representatives, Health Agents

❖ Program Implementation Team (Team 2)

- ◆ Discusses local implementation issues of the design such as access to property and presentation of information to the local citizens; Distributes information to the public through their own presentation of the material
- ◆ Local Group Members, Local Citizens

✳ Public Meetings

Public meetings are held six times per year in local schools and libraries. The meetings are designed to present information to the general public and answer any questions about the plume containment design.

✧ IRP Contacts

The IRP provides two ways in which to speak with the agency directly: Douglas Karson, the Public Affairs Specialist; and the Unified Environmental Planning Office (UEPO) which has an environmental hotline number for citizens to call with their questions.

✧ Technical Environmental Affairs Committee (TEAC)

TEAC meetings are used to present the most current designs of the plume containment system in a technical manner to the committee members and general public. The committee consists of selectmen, local group members, Cape Cod Commission representatives, etc. The audience contains many local group members and a few citizens from the general public sector.

✧ Information Sites

Information is placed in the Bourne, Falmouth, Mashpee, and Sandwich Libraries and news releases are often printed in the local newspapers. Douglas Karson, the Public Affairs Specialist of the IRP, speaks with the papers weekly.

5.2 Local Groups

As alluded to above, local group members participate in IRP citizen committees, public meetings, and TEAC meetings. These groups serve to inform their own public by distributing their own information about the MMR. They serve as a crucial link between the MMR and a broader, public audience. Consequently, an informal telephone survey was conducted to define their primary sources of information about the MMR; their information distribution techniques to their public; and the extent of their public audience.

The following questions were asked of fifteen local groups:

- ✧ How many members belong to your group?
- ✧ Is your group a local one (e.g. specific to a site or town) or are your members from different parts of the area?
- ✧ Do you distribute information about the MMR to the public?
- ✧ If yes, how do you do it? (e.g. telephone, pamphlets, WWW page, etc.)
- ✧ From what sources do you acquire your information about the MMR?

The information collected through the interviews was consolidated for easier analysis; only the most common responses to the questions were included in the following analysis of the interview results. Therefore, the percentages shown in the tables should not be taken as precise values. The interviews were conducted to assess the general trends of information sources and distribution techniques, rather than to determine exact percentages. Nevertheless, the information is still very valuable because the major pathways of information flow are highlighted.

5.2.1 Sources of Information

The responses to the following question about the sources of MMR information to the local groups are summarized in Table 5-1:

- ❖ **From what sources do you acquire your information about the MMR?**

Table 5-1. Sources of MMR Information to the Local Groups

<i>Local Groups</i>	<i>Meeting Attendance</i>	<i>Committee Members</i>	<i>Site Mailing List</i>	<i>Newspaper</i>
Alliance for Base Cleanup (ABC)	✓	✓		
Ashumet-Johns Pond Association	✓	✓		
Ashumet Valley Property Owners Inc. (AVPOI)	✓	✓	✓	✓
Assoc. for the Preservation of Cape Cod (APCC)	✓	✓	✓	
Cape Cod Commission (CCC)	✓	✓		
Cape Cod Group - Sierra Club	✓		✓	✓
Coalition for Buzzards Bay	✓	✓		
Coonamessett Pond Association	✓			
Johns Pond Association			✓	✓
LF-1 Committee	✓	✓		✓
Mashpee-Briarwood Association	✓	✓	✓	
Otis Conversion Project	✓		✓	
Pocasset Village Association	✓		✓	✓
Responsible Envir'l Protection for Sandwich (REPS)	✓	✓		
Upper Cape Concerned Citizens	✓	✓		
<i>Local Group Information Sources</i>	93%	67%	47%	33%

- *Meeting Attendance* refers to attending meetings organized by the IRP - public meetings, and citizen teams (LRWS, Team 1, Team 2, TEAC);
- *Committee Members* delineates those groups which have members who serve on the aforementioned citizen teams;
- *Site Mailing List* refers to the IRP's *Environmental Update* newsletter and other information the IRP distributes through the list;
- *Newspaper* refers to articles printed in the local newspapers.

Attending meetings arranged by the IRP is the most widely used source of information about the MMR; 93% of respondents said they collect information in this manner. Sixty-seven percent (67%) of the local groups have members which serve on citizen committees of the IRP. In addition to attending meetings, 47% of the respondents

receive information through the site mailing list which is also organized by the IRP. Interestingly, the one group which does not attend meetings, the Johns Pond Association, does receive and primarily use the site mailing list and the *Environmental Update* for its information. Therefore, 100% of respondents receive information about the MMR from the IRP.

One-third of the local groups use the local newspapers as a source of information. The newspapers regularly print articles about the MMR. These articles are submitted by the IRP, local groups, and local citizens.

Therefore, the IRP plays the largest role as a source of information about the MMR through the citizen committees, public meetings, and site mailing list. The newspaper plays a secondary but important role in providing information because it is the only source not exclusively affiliated with the MMR.

5.2.2 Distribution of Information

The responses to the following questions about the distribution of information by the local groups are summarized in Table 5-2:

- ❖ **Do you distribute information about the MMR to the public?**
- ❖ **If yes, how do you do it?**

Table 5-2. Distribution of MMR Information by Local Groups

<i>Local Groups</i>	<i>Regular Newsletter</i>	<i>Newspaper (TV, Radio)</i>	<i>Action Alert</i>	<i>Public Talks</i>	<i>Leafletting Mailboxes</i>
Alliance for Base Cleanup (ABC)	✓				
Ashumet-Johns Pond Association	✓	✓			
Ashumet Valley Property Owners Inc. (AVPOI)	✓	✓	✓		
Assoc. for the Preservation of Cape Cod (APCC)	✓			✓	
Cape Cod Commission (CCC)	✓		✓	✓	
Cape Cod Group - Sierra Club	✓	✓	✓		
Coalition for Buzzards Bay	✓				
Coonamessett Pond Association	✓				
Johns Pond Association	✓				
LF-1 Committee	✓	✓		✓	✓
Mashpee-Briarwood Association	✓				
Otis Conversion Project	✓	✓			
Pocasset Village Association	✓				
Responsible Envir'l Protection for Sandwich (REPS)		✓			✓
Upper Cape Concerned Citizens					
<i>Local Group Information Distribution</i>	67%	40%	20%	20%	13%

- *Regular Newsletter* refers to a newsletter which is mailed by the local group to a certain constituency 2-4 times per year;
- *Newspaper (TV, radio)* refers to submitting articles or editorials to the newspaper. TV and radio were included in this category because they are a minor form of public media;
- *Action Alert* refers to a special newsletter which is sent out on urgent MMR issues to a select group of people;
- *Public Talks* refers to giving presentations to local officials and/or other local groups and/or public meetings;
- *Leafleting Mailboxes* refers to placing information about the MMR in residents' mailboxes.

The regular newsletter is the most widely used way for the local groups to distribute information; 67% distribute newsletters 2-4 times per year. These newsletters are not exclusively dedicated to MMR-related issues; they include articles about the MMR usually when an issue is affecting their particular constituency. An *Action Alert* is used by 20% of the groups in addition to the newsletter. These special newsletters are issued for specific and urgent issues concerning the MMR. They are usually distributed to a particular area or neighborhood.

Information is also distributed through the use of the newspaper. Forty percent (40%) of the groups submit articles and editorials to the newspapers including the *Cape Cod Times*, *Mashpee Messenger*, and *The Enterprise*.

Two minor routes for distribution include giving public talks to local groups, officials, and interested parties; and leafleting mailboxes. The LF-1 Committee and Responsible Environmental Protection for Sandwich (REPS) leaflet mailboxes on a semi-regular basis instead of using the newsletter format.

An indirect route to distribute information is by telephone. [Note: “Telephone” was not included in Table 5-2 because it is a more passive rather than active way in which the groups distribute information.] Many of these groups receive telephone calls from fellow group members, local officials, and the general community. The Cape Cod Commission (CCC), in particular, receives many phone calls each day. Local residents and officials call for information, statistics, and answers to questions.

Therefore, a regular newsletter is the most widely used way of distributing information by the local groups to the general public. There are five groups which do not have newsletters; two of the five leaflet mailboxes instead with important information on specific MMR issues. If these two routes are added together, 80% of information is distributed through some type of newsletter.

5.2.3 Extent and Type of Local Groups

Two questions were asked of the local groups in order to determine the extent of their respective audiences. The responses to the following questions are summarized in Table 5-3:

- ❖ **How many members belong to your group?**
- ❖ **Is your group a local one (e.g. specific to a site or town) or are your members from different parts of the area?**

Within Table 5-3, the groups were also categorized into four “types” based on the extent of their information distribution activities. The “extent” of their activities was determined from the sense of the entire interview as to the activeness and organization of the group.

Table 5-3. Extent and Type of Local Groups

<i>Local Groups</i>	<i>No. of Members</i>
<u><i>Environmental Groups - Regional</i></u>	
Assoc. for the Preservation of Cape Cod (APCC)	3000
Cape Cod Commission (CCC)	300
Cape Cod Group - Sierra Club	700
Coalition for Buzzards Bay	2800
Total Membership	6800
<u><i>Environmental Groups - Local</i></u>	
Ashumet-Johns Pond Association	90
Coonamessett Pond Association	60
Responsible Env'l Protection for Sandwich (REPS)	70
Total Membership	220
<u><i>MMR - Related Groups</i></u>	
Alliance for Base Cleanup (ABC)	50
LF-1 Committee	600
Otis Conversion Project	20
Upper Cape Concerned Citizens	10
Total Membership	680
<u><i>Homeowner Groups</i></u>	
Ashumet Valley Property Owners Inc. (AVPOI)	250
Johns Pond Association	115
Mashpee-Briarwood Association	250
Pocasset Village Association	200
Total Membership	815

- *No. of Members* refers to the number of people reached by a groups' newsletter except where noted in the text

As shown in Table 5-3, the local groups were organized into four categories:

- Regional Environmental
- Local Environmental
- MMR-Related
- Homeowner

Regional Environmental Groups have members from all over Cape Cod and outside the region. Their membership is very large and they concentrate on many issues which affect nature on Cape Cod, including the MMR. Many people contact these groups by telephone with their immediate questions. They also have part or full time staff which work exclusively for these groups. They have a great amount of knowledge and are very concerned with issues affecting their area. Their information dissemination processes are extensive including regular newsletters, scientific articles, books, libraries, open telephone lines, etc. Note: the Cape Cod Commission membership number is a gross under-estimation. This listed number in the table designates the number of people reached by their newsletter. Many people call this organization for information.

Local Environmental Groups have a similar focus but at the local level. The two Pond Associations deal with issues surrounding the preservation of the pond environment. Their memberships are much smaller, however, and concentrated around the ponds. Nevertheless, they have an active and knowledgeable membership and receive questions from the pond area residents. REPS concentrates on environmental issues within Sandwich. It is actually an activist group which “activates” itself when issues arise. Therefore, the membership number quoted here actually refers to the number of

people who participate in petitioning activity during active times. Nevertheless, the group, when active, is a strong one and hence placed in this category.

MMR-Related Groups were formed specifically to address issues surrounding the MMR. In comparison to the environmental groups, their membership is very small. Since these groups were formed when the MMR plumes were discovered, they have existed for quite awhile. As a result, their membership has waned. These groups, for the most part, are presently not very active. None of them have regular newsletters that they send out to their members. [Note: the LF-1 Committee membership represents the number of people reached by their semi-regular leafleting activities. The number of people actually on the committee is 18.]

Homeowner Groups are comprised of members living within a particular neighborhood. They are required to belong to the group because they own property in that neighborhood. The exception is the Pocasset Village Association which has no residency requirement but is comprised of mostly Pocasset Village residents. It is placed in this category because it is organized in a similar manner. The main focus of these groups is not the MMR - they are mainly concerned with civic issues within their neighborhood. In general, they have one yearly meeting of the entire group. There are a few active members in the AVPOI and Mashpee-Briarwood groups who serve on or attend citizen committees. The Pocasset Village and Johns Pond Associations are not involved with the MMR to a large extent. An overall trend with homeowner groups is that a few of their members are active in MMR issues while the bulk of their membership is not actively aware of the current situation.

Therefore, the *Regional Environmental Groups* have the largest audience and are the most active. At the local level, the *Local Environmental Groups* are very active at a smaller scale. However, their activities to distribute information are not so extensive. *MMR-Related Groups* for all intents and purposes are inactive while the *Homeowner Groups* are selectively active but in general inactive.

5.3 Conclusion

The primary source of information to the local groups is the Plan through citizen committees, public meetings, and the site mailing list. The newspaper plays a secondary role as an information source. The local groups' primary way to distribute information is through the use of a regular newsletter. Finally, *Regional Environmental Groups* represent the largest and most active constituency while the *Local Environmental Groups* take the same role but at a smaller scale. The other two types of groups, *MMR-Related* and *Homeowner*, are comparatively inactive.

6. Recommendations for Implementation

The following recommendation for implementing an educational program is based on the information collected about the local groups in the previous section; and information informally collected at public meetings and through the interviews.

Two issues must be addressed in order to effectively implement an educational program: the presentation of information within the educational program; and the distribution of the information through the local groups.

Presentation

In order for an educational program to be effective in informing the general public, information must be presented at an appropriate level. The IRP's presentation of material to the public, thus far, has proved to be inappropriate. To date, the IRP has informed the general public through public meetings. However, these meetings tend to be very technical in nature with little time for questions from the public. Similarly, answers are often very complex and beyond the comprehension level of the general public. Even the *Environmental Updates* which are made expressly for the public's understanding of issues affecting their lives is too technical in nature. In past years, the IRP has conducted interviews with a host of different types of local people; their responses reflect these sentiments:

1989: "Nearly all the interviewees expressed concerns that information put out [by the MMR] is too technical. Most of the interviewees feel clean, concise, understandable summaries of technical documents should be made available to the public."

1992: “Another person suggested that fact sheets be less technical and more stringent and direct.”

1995: “A concern was expressed regarding public presentations containing ‘overusage of acronyms’ and being ‘too technical in nature’.”

Even the last round of interviews in 1995 highlighted that the technical nature of the material hindered the public’s comprehension of the issues. The public is looking for concise answers to their questions, not lengthy and detailed technical explanations of the workings of the project.

Question and Answer (Q&A) sheets lend themselves to this type of format. They state commonly asked questions with short answers that are non-technical in nature. For example:

Q: Is the treated water safe?

A: Yes. The water will be treated to non-detectable levels of contaminants. The system will be monitored to ensure that it is working properly. Many other parts of the country use treated water including Barnstable, MA.

Granted, this answer is very simplistic and ignores a few of the complexities of the situation including: the very minor levels of residual contaminants that can be left in the water; and the regular but not continuous monitoring of the water. Although, for all intents and purposes, the effects of such low levels of contaminants are negligible. However, when these additional issues are brought into the explanation, the public loses confidence in the water and becomes confused with too many technical details.

Therefore, the Q&A format conveys information to the public at an appropriate level for their understanding.

Information Distribution

As stated earlier, the local groups play an important role in conveying information about the MMR to the general public. The most prevalent format for distributing information to the public is through the use of a newsletter; eighty percent (80%) of them use newsletters. The remaining 20% do not use a newsletter: ABC, Otis Conversion Project, and Upper Cape Concerned Citizens. However, with closer inspection, these three groups constitute the smallest number of members who participate in local groups. They are also the least active groups. Therefore, a Q&A sheet designed for a newsletter format would reach virtually all the members of the local groups. In the event that resources were limited, the regional environmental groups would be the most important group to involve in the program because of their wide audience, extensive activities, and larger resources.

Limitations

One of the main limitations to this process would be the source of the information to the local groups. As discussed earlier, the IRP provides information to 100% of the local groups through meetings or the site mailing list. Sixty-seven percent (67%) of these groups have members on IRP committees. These members represent nearly all of the very active groups in the area. Therefore, the IRP could easily present the Q&A sheet

directly to these committee members through their regularly scheduled meetings. Other groups also attend these committee meetings and would indirectly receive information, too. The IRP could also indirectly present the Q&A sheet through the site mailing list. However, this scenario assumes the IRP would be willing to invest time and money in implementing this program. However, their main concern is the contaminant of the plumes, not public perception issues. Therefore, an organized source of information to the local groups may be problematic.

A second limitation to this process is the assumption that the local groups support the use of treated water. This assumption may not be a valid one: many of the most active members of the groups which attend IRP committee meetings are definitely against using treated water. They, too, would need to be educated about the realities of using treated water.

7. Conclusion

This study provides a way in which to address the current public perceptions against drinking treated groundwater. Suggestions and information are given to educate the public about treated water use and allay many of their fears. Through the use of the local groups' newsletter, a way in which to implement such a program is also feasible. However, the one issue which is not fully resolved is the distrust of the MMR. This distrust likely has an effect on the public perception of drinking treated groundwater. This statement requires validation but the example provided by Barnstable is good evidence. In this community, the tradition of pristine water has been set aside. They trust in their water superintendent to provide good drinking water and hence, trust in the treatment system.

This negative sentiment creates a barrier to implementing such an educational program through the local groups. Unless the local groups make a concerted and joint effort to educate the public, the MMR is the only source from which information can originate in a cohesive and standardized manner. Therefore, this distrust may hinder the effectiveness of an educational program in numerous ways. For example, the local groups may not trust the information provided to them by the IRP.

The obvious answer to this problem is to gain the public's trust. However, at this point in time, this solution is unlikely. Currently, the containment design is undergoing complete reconfiguration because of many issues which were overlooked during the

original design process. In the past, the local groups have asked questions about many of these issues to no avail. Their inquiries were essentially ignored. This current example only frustrates the relationship between the MMR and the local community. Remedying the problem of distrust is not likely in the near future.

Therefore, in order to effectively implement an educational program to address public perceptions, the local groups may have to look to different sources of information. Options open to them include the Cape Cod Commission, other large local groups, and the water district superintendents. However, Barnstable has shown that Cape Cod can be open to using treated water in the future. The special circumstances surrounding the MMR present many confounding factors which hinder the acceptance of drinking treated groundwater.

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Appendix A:

**Summary of Recommendation Regarding the
Beneficial Reuse of Treated Water**



DEPARTMENT OF THE AIR FORCE
INSTALLATION RESTORATION PROGRAM (ANG)
OTIS AIR NATIONAL GUARD BASE, MA 02542-SC23

July 20, 1995

Memorandum For The MMR IRP Senior Management Board

SUBJECT: Summary of Recommendations Regarding The Beneficial Reuse
of Treated Water

As directed at the last Senior Management Board meeting on July 6, 1995, members of both Team #2 (Local Implementation Team) and the Long Range water Supply (LRWS) Process Action Team (PAT) assumed the task of evaluating possible options of beneficial reuse of the treated water from the future plume containment system (see attached tasking memo). A follow-up effort regarding review and comment on a document to be prepared by OPTEC on this subject, will be conducted and furnished under separate cover on or about August 8th. Members of both teams (henceforth referred to as the Group) met to discuss this issue on July 13th and 18th. The minutes of these meetings are also attached for your review.

The Group discussed the following possible beneficial reuses of treated plume water:

- Potable uses
- Irrigation
- Agriculture
- Surface Discharge to Ponds or Streams
- Subsurface Discharge into Ponds

SUMMARY OF RECOMMENDATIONS

1) Potable Uses

After lengthy discussion, most members of the Group felt that the potable use alternative was not feasible and recommends against such an option. However, this issue was found to be VERY complex, and the future demand for potable water may alter this opinion at some point in the future. Therefore, the Group wishes to furnish the following additional comments:

- A major factor in not supporting this option was the belief by the Group that it lacks sufficient public acceptability at this time. Additionally, there is not sufficient time to undertake public education activities. These activities would likely include explaining the

TASKING FOR Team #2 (Local Implementation Team)
Long Range Water Supply Process Action Team

SUBJECT: Beneficial Reuse of Treated Water

In a joint effort, the teams are directed to discuss and evaluate possible reuse scenarios for the water that will be generated by the plume containment project. There may be a quantity of water available after the required reinjection is accomplished that could be redirected for other beneficial use. The groups need to consider various types of uses and evaluate the public acceptance of each.

To complete this tasking, a report with recommendations for reuse shall be prepared and submitted to the Senior Management Board (through the IRP office) on 20 July.

The two teams will also review and comment on a paper to be prepared by OpTech that discusses reuse considerations as part of the containment design. That paper will be provided to the teams on 25 July with comments due by 8 August.

SUBJECT: Summary of Recommendations Regarding The Beneficial Reuse
of Treated Water (cont.)

merits of using filtered, treated, and monitored water for potable uses (verses the supply options currently available to them). The Group felt that it would take at least 5-10 years to change public opinion on this issue.

- The group felt that the target water treatment goal (for public acceptance) for any such reuse should be to a non-detectable concentration of VOC's or plume contaminants. As such, distribution/reuse of treated water with concentrations between MCL's and non-detect is not recommended.

- The Group recognizes the potential that a community or water district, at some point in the future, may believe that it is in the best interest of its rate payers to obtain access to some quantity of the treated water to meet demand. Such access should remain an option during the design process. Additionally, this may involve the following considerations:

- Distribution, Storage and treatment facilities operated by the Town (water district)
- Public user acceptability

2) Irrigation/Agricultural Uses

These reuse options were also rejected by the Group as feasible recommendations, primarily due to the lack of public acceptability. It was felt that the public would not consent to the irrigation of crops or landscape areas with treated plume water containing any concentration of contaminants. Furthermore, the demand for the water for these purposes would be seasonal only, and insufficient to handle the quantity of water available for reuse.

3) Surface/Subsurface Pond or Stream Discharges

The Group voted against recommending this alternative, again primarily because of the lack of public acceptability.

GENERAL RECOMMENDATIONS

It also must be noted that the Group wished to furnish the following general recommendations:

SUBJECT: Summary of Recommendations Regarding The Beneficial Reuse
of Treated Water (cont.)

* Due to: 1) The present lack of public acceptability; 2) The absence of adequate available groundwater modeling information (to determine the actual quantity of treated water available for reuse); and 3) The winter demand for any such reuse will likely not exist, it is recommended that the design provide for the capability to reinject 100% of the treated water.

* The plume response/containment actions should not result in the lowering of pond or stream levels.

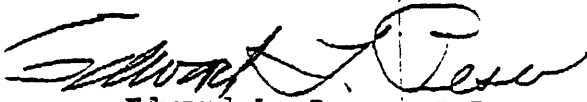
* Water treatment levels should be to the non-detectable concentration for any reuse of treated water (except for reinjection).

* Treated water should likely be returned to the approximate location of it's extraction if feasible (via reinjection wells, leaching galleries, or sand infiltration beds).

In summary, the Group generally recommends against any of the proposed beneficial reuses of treated plume water. They further understand the complex and controversial nature of this issue, and recognize the option may still exist (based on demand and the economics of a particular community) for treated water to be made available in certain situations.

Also, please find enclosed, a copy of a letter furnished to me from the REPS organization. This letter also does not support any of the above reuse options, but does mention that during emergencies, they would support the use of treated water for firefighting.

Furnished on Behalf of Team #2 & the LRWS PAT,


Edward L. Pesce, P.E.
Chairman, Team #2

4 attachments

SUBJECT: Summary of Recommendations Regarding The Beneficial Reuse
of Treated Water (cont.)

merits of using filtered, treated, and monitored water for potable uses (verses the supply options currently available to them). The Group felt that it would take at least 5-10 years to change public opinion on this issue.

- The group felt that the target water treatment goal (for public acceptance) for any such reuse should be to a non-detectable concentration of VOC's or plume contaminants. As such, distribution/reuse of treated water with concentrations between MCL's and non-detect is not recommended.

- The Group recognizes the potential that a community or water district, at some point in the future, may believe that it is in the best interest of its rate payers to obtain access to some quantity of the treated water to meet demand. Such access should remain an option during the design process. Additionally, this may involve the following considerations:

- Distribution, Storage and treatment facilities operated by the Town (water district)
- Public user acceptability

2) Irrigation/Agricultural Uses

These reuse options were also rejected by the Group as feasible recommendations, primarily due to the lack of public acceptability. It was felt that the public would not consent to the irrigation of crops or landscape areas with treated plume water containing any concentration of contaminants. Furthermore, the demand for the water for these purposes would be seasonal only, and insufficient to handle the quantity of water available for reuse.

3) Surface/Subsurface Pond or Stream Discharges

The Group voted against recommending this alternative, again primarily because of the lack of public acceptability.

GENERAL RECOMMENDATIONS

It also must be noted that the Group wished to furnish the following general recommendations:

SUBJECT: Summary of Recommendations Regarding The Beneficial Reuse
of Treated Water (cont.)

* Due to: 1) The present lack of public acceptability; 2) The absence of adequate available groundwater modeling information (to determine the actual quantity of treated water available for reuse); and 3) The winter demand for any such reuse will likely not exist, it is recommended that the design provide for the capability to reinject 100% of the treated water.

* The plume response/containment actions should not result in the lowering of pond or stream levels.

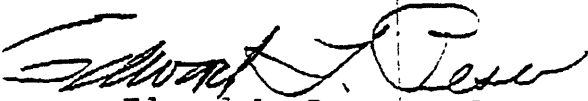
* Water treatment levels should be to the non-detectable concentration for any reuse of treated water (except for reinjection).

* Treated water should likely be returned to the approximate location of it's extraction if feasible (via reinjection wells, leaching galleries, or sand infiltration beds).

In summary, the Group generally recommends against any of the proposed beneficial reuses of treated plume water. They further understand the complex and controversial nature of this issue, and recognize the option may still exist (based on demand and the economics of a particular community) for treated water to be made available in certain situations.

Also, please find enclosed, a copy of a letter furnished to me from the REPS organization. This letter also does not support any of the above reuse options, but does mention that during emergencies, they would support the use of treated water for firefighting.

Furnished on Behalf of Team #2 & the LRWS PAT,



Edward L. Pesce, P.E.
Chairman, Team #2

4 attachments