Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: One

Phone Number: (617)-498-9070 Date: 3-22-89

Draft

Drought Contingency Plan

pursuant to

The Massachusetts Water Resources Authority

and

The Metropolitan District Commission

Declaration of Water Emergency

February 16, 1989

Prepared by (city or town):

CAMBRIDGE

Prepared for:

The Department of Environmental Quality Engineering
Division of Water Supply
One Winter Street
Boston, MA 02108

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Two

Phone Number: (617)-498-9070 Date: March 1989

Community Information
for

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1989

Legally Responsible Party:

Name: Robert W. Healy , City Manager Phone: (617)-498-9011

Address: City Hall
795 Mass. Ave.
Cambridge, MA. 02139

Fax:

Primary Contact (if different):

Name: John J. Cusack, Jr.
Timothy W.D. MacDonald
Phone: (617)-498-9070

Address: Cambridge Water Department
250 Fresh Pond Parkway
Cambridge, MA. 02138

Fax:

MWRA Status (please circle):

(Full Member) Contract Emergency Fully Served Partially Served

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Three

Phone Number: (617)-498-9070 Date: March 1989

A. Water Resources Commission

Water Conservation Plan

See attachment

CITY OF CAMBRIDGE

MASSACHUSETTS

WATER DEPARTMENT
250 FRESH POND PARKWAY
CAMBRIDGE, MASS. 02138

617-498-9070

Cambridge Water Department

Water Conservation Plan

March 1989

WATER CONSERVATION PLAN

COMMUNITY CAMBRIDGE

DATE March 1989

Water Conservation Plan

PART I

DESCRIPTION AND ANALYSIS OF WATER CONSERVATION MEASURES

To be filled out by each water supplier in a community, or the town or city water department.

Name of water supplier: Cambridge Water Department

Address: 250 Fresh Pond Parkway, Cambridge, MA. 02138

Owner or operator, name and phone: John J. Cusack, Jr., Superintendent (498-9070)

Name and location of Water supply source(s) Hobbs Brook Reservoir(lincoln,Lexington,Waltham) Stony Brook Reservoir (Weston, Waltham) Fresh Pond Reservoir (Cambridge)

Population served 91,260

Number of service connections 13,531

Average water use by category (refer to, or attach, Department of Environmental Quality Engineering, Division of Water Supply annual report):

'SEE ATTACHED SHEET)

Category	MGD	%	NUMBER OF ACCOUNTS	PERCENT OF SALES
Residential			11,173	45.0
Commercial			1,283	17.0
Industrial			157	14.0
Agricultural			327	2.5
Municipal			(not billed by ordinance)	
Other			591	21.5
Unaccounted-for*			13,531	100
TOTAL				

General system related questions:

1) What is the total gallons per capita per day (gpcd) figure for your system? 178 gpcd

This can be estimated by dividing the total amount of water used in one year by 365 days and the number of people served.

2) What is the residential gpcd figure for your system? 80 gpcd

This can be estimated by dividing the amount of water used in one year in the residential category by 365 days and the number of people served.

3) Describe the "unaccounted-for" water in your system and how it was determined Municipal accounts are not billed, 0.5 MGD leakage from Payson Park (drains back to Fresh Pond. 7.3% based on 1982 report plus 2% leakage flow based on 1989 leak study (82% complete) = 9.3% unaccounted for water.

* Generally, "unaccounted-for" water refers to water that cannot be accounted for. This would be the difference between the amount of water that is withdrawn and the amount that is billed. Describe your systems unaccounted-for water in the response to question 3.

CITY OF CAMBRIDGE
WATER DEPARTMENT

TABLE I

WATER USAGE BY USER GROUP AND/OR
CATEGORY FOR 1982

Classification	Water Usage (Million Gallons)	Percent of Total Consumption
*Residential	2183.63	37.0
*Industrial	646.27	10.9
*Commercial	838.66	14.2
*Institutional	1054.16	17.9
Municipal	79.25	1.3
Fire Supply	13.16	0.2
*Construction	--	--
Subtotal	4815.13	81.5
Reservoir Leakage	182.50	3.1
Leakage Found During Survey	620.50	10.5
Under-Registration of Meters	120.00	2.0
Unavoidable Leakage	147.83	2.5
Unaccounted For	17.33	0.4
TOTAL	5903.29	100.0

*Denotes a "billable" user category.

4) Estimate the percentage of "unaccounted-for" water by category

Category	Percentage
Domestic meter under-registration	_____
Non-domestic meter under-registration	_____
Public unmetered use	_____
Potentially recoverable leakage	_____
Other (including unavoidable leakage)	_____
TOTAL	_____

5) Have you targeted certain users (for example: large industrial users) and promoted conservation? X yes _____ no

If yes, explain why these groups were chosen and attach a list of targeted users The C.W.D. has established an increasing block rate structure (effective July 1, 1989).

THE NEXT SECTION INCLUDES QUESTIONS ON SPECIFIC CONSERVATION MEASURES:

- METERING
- WATER AUDIT, LEAK DETECTION and REPAIR; SYSTEM REHABILITATION
- PRICING
- PUBLIC EDUCATION/INFORMATION/PARTICIPATION
- DROUGHT AND EMERGENCY PROCEDURES/PLANNING
- EFFICIENT WATER FIXTURES/OTHER MEASURES
- PROTECTION

For your information and reference, the basic goal of each measure is stated, along with recommended actions. For each measure you are asked to: describe past and present efforts, their effectiveness, shortcomings and cost. This information then provides background for an explanation of future efforts and how they will be implemented. Reference materials are included in the appendices.

APPENDIX A - Samples of completed sections of a WATER CONSERVATION PLAN
APPENDIX B - Full Cost Pricing: An Introduction
APPENDIX C - Emergency Planning Guidance
APPENDIX D - Conservation measures, table showing cost and savings
APPENDIX E - Water Saving Devices and Retrofit Kits
APPENDIX F - Enterprise Funds

CITY OF CAMBRIDGE

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WATER DEPARTMENT
250 FRESH POND PARKWAY
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Cambridge Water Department

Water Conservation Plan

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Conservation Measure: Metering

- C.W.D. system is 100% metered
- customer meters are read twice annually (February 89-there are active discussion of implementing quarterly billing for conservation and stable billing/income)
- on-going meter repair and replacement based on service replacement and customer requests and C.W.D. checks between meter readings and historic billing.

Conservation Measure: METERING

GOAL: To provide an accurate measurement and record of water use, and promote water conservation

RECOMMENDED ACTIONS:

- 100% metering of all consumptive users, including public buildings
- on-going metering program with the ability to test, recalibrate, repair or replace meters on a regular basis

Past and Present Efforts:

1) What percent of your system is metered? 100 % less municipal accounts

2) Number of operable meters in system 13,531

List the percentage of users metered by category:

Residential 100 % Industrial 100 % Commercial 100 %
Public _____ % Other _____ % INSTITUTION 100%

3) Are all public buildings metered? ____YES X NO, if No ? % metered

4) How often are the master meters (source meters) calibrated? New meter instrumentation being installed will be calibrated annually

5) How often are the master meters read? Daily-continuous recording

6) How often are customer meters read? 2/year, in processed changing to 4 times/year

7) What is the general condition of your meters? master after instrumentation change, Good customer good

8) Do you use externally read meters? X YES ____ NO If YES, 10 %

9) Do you have a on-going program to monitor, check, repair, and replace meters? X YES _____ NO

If YES, briefly explain your program
- meter readers refer to problem accounts to meter shop for repair or replacement.
- meters tested and/or repaired and replaced based on consumer inquiries.

10) Have you applied for a DEQE meter modernization grant?
_____ YES _____ NO Do you intend to apply? _____ YES X NO

If YES, list actual or projected date of application, and status

For information on the grant program call DEQE, Division of Water Supply (617) 292-5770

METERING continued...

Effectiveness:

11) Has your metering repair and calibration program been effective in reducing the amount of unaccounted-for water, increasing revenues, or decreasing demand?

Briefly explain: Increasing cost of water and sewer has heightened consumer interest in meter condition.

Shortcomings:

12) What are the problems associated with metering? Why has it been difficult to implement? Inability to keep meters in public buildings.

Cost: (include direct cost and labor cost)

13) Estimate how much is spent on the metering program per year $ 529,000

This cover costs for materials, time, and labor

BRIEFLY REVIEW WHAT YOU HAVE DONE, AND DESCRIBE WHAT YOU PLAN TO DO:

Future Efforts:

14) What are the long-range goals for a metering program?
a) The C.W.D. is implementing quarterly billing and meter reading.
b) The C.W.D. is installing ARB as replacement meters.

15) What measures will be taken to implement these goals?
(a) discussions are on-going
(b) replacement of meters is on-going.

16) What is the timetable for this, how will it be implemented and who will administer it?
a) time table for switch to quartely will be co-ordinated with the budget cycle, and will be implimented by Water Superintendent.

17) What is the approximate cost of these efforts and the funding source?

Any costs will be funded by the water rates.

CITY OF CAMBRIDGE

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Cambridge Water Department
Water Conservation Plan

March 1989

Conservation Measure: Water Audit, Leak Detection and Repair, and System Rehabilitation

- C.W.D. committed to routine survey's (previous study 1984, current on-going 100% survey of distribution system.)
- C.W.D. maintains a distribution maintenance division which routinely repairs all detected leaks.
- C.W.D. maintains an on-going capital expenditure program. Historically it is One Million dollars a year with 50% spent on distribution system improvements.
- C.W.D. has three MDC/MWRA connections used to provide emergency and supplimental water supply.

Conservation Measure: WATER AUDIT, LEAK DETECTION AND REPAIR: SYSTEM REHABILITATION

GOAL: Minimize leakage, reduce water demand, and maintain system in good working order

RECOMMENDED ACTIONS:

- Check 100% of the system for leaks every other year (at least every 5 years).
- Fix every "detectable" leak as soon as possible
- Have an on-going system rehabilitation program with adequate financial resources for maintenance and unexpected problems

Past and Present Efforts:

1) Do you regularly do a Water Audit X Yes _____ No

A Water Audit is an inventory of water coming into and leaving the system. This is usually the first step in determining unaccounted-for water.

2) Do you regularly do a leak detection survey of your system?
X YES _____ NO If YES, how often 1984 and 1989 will be done on frequency mandated by M.W.R.A.
Briefly explain the leak detection program (% of system surveyed, miles of pipe, type of equipment used, listening points, etc.)
100% of system surveyed by M.W.R.A. contractor

3) List the date of the most recent leak detection survey March 1989

4) How quickly do you respond to fix "detectable" leaks ? C.W.D. maintains staffing to fix detectable leaks as discovered.

5) Have you applied for or received DEQE or MWRA assistance to do leak detection? X YES _____ NO
Date of application _____ status _____
Describe assistance: Current 100% M.W.R.A. funding of survey

6) Have you applied for or received a DEQE Water System rehabilitation grant? X Yes _____ No.

7) Do you have a capital improvement or master plan for the water system?
X YES _____ NO Date_____

8) Do you have financing to implement the program? X Yes _____ No

9) Do you have funds set aside for regular maintainance X YES ____ NO
for emergency repairs ? X YES ____ NO

WATER AUDIT, LEAK DETECTION AND REPAIR, SYSTEM REHABILITATION continued...

Effectiveness:

10) How effective have these efforts been? Please explain in detail:
Less total leakage located in 1989 study than 1984 study.

11) Estimate how much water you have prevented from being lost per year _____ (MGD) and/or after a major leak detection survey _____
Current survey has detected 169,000,000 MG/year.

Shortcomings:

12) What problems are associated with leak detection and system rehabilitation efforts? _____

Cost: (include direct cost and labor cost)

13) Estimate how much is spent on leak detection/system rehabilitation per year:
$ 27,000 leak detection
$ 0.5 million system rehabilitation through capital improvement
$ $500,000 system rehabilitation through operating budget

BRIEFLY REVIEW WHAT YOU HAVE DONE, AND DESCRIBE WHAT YOU PLAN TO DO:

Future Efforts:

14) What are the long-range goals for a leak detection and system repair program?
Much of the system is old, ie, 1800's the on-going capital program is systematically rehabilitating the sytem.

15) What measures will be taken to implement these goals? _____
Strong commitment of Cambridge Water Board and the Cambridge City Council to annual capital improvement projects.

WATER AUDIT, LEAK DETECTION AND REPAIR AND SYSTEM REHABILITATION continued...

Future Efforts

16) Estimate the reduction in water use (MGD) that could be achieved if the measures listed above are implemented _____MGD
Surveys suggest C.W.D. repairs the equivalent of at least 169/MG/year of leaks annually.

17) What is the timetable for this, how will it be implemented and who will administer it? System rehabilitation is on-going and administered by Superintendent.

18) What is the approximate cost of these efforts per year, and the funding source?
Water-rate - volume billed.

Conservation Measure: PRICING

GOAL: To generate revenue to cover the costs of providing water, promote conservation and reduce demand

RECOMMENDED ACTIONS:

- Collect revenues to cover the "full cost" of providing water
- Set up an enterprise fund account for water
- Use an increasing block rate structure
- Institute seasonal pricing to reduce peak demands
- Do frequent billing (monthly or bi-monthly) and stagger the billing procedure

Past and Present Efforts:

1) What is the current rate structure used by your system?

	ANNUAL CONSUMPTION	WATER RATE (PER CcF)	SEWER RATE (PER CcF)
Block 1	0-40 CcF	.80	1.34
Block 2	41-400 CcF	.85	1.43
Block 3	401-2,000 CcF	.91	1.53
Block 4	2,001-10,000 CcF	.97	1.65
Block 5	Over 100,000 CcF	1.04	1.75

**All consumption is measured in hundreds of cubic feet (CcF).

Attach a copy of your pricing schedule for water

3) What is the current price level for a given volume of sewage? See Above

4) How often are customers billed? Twice a year/changing to four.

5) Do bills include conservation notices, information ? X YES _____ NO
M.W.R.A. materials have been distributed.

6) Is the volume of water used, stated on the bill measured in gallons? _____ Yes X No 100 C.F.

7) Is the price of water based on the "full cost" of providing water? This includes all costs related to operating, maintaining, and improving your water supply system (see Appendix B for a discussion of full cost pricing). X YES _____ NO

Please provide a brief explanation _____

Effectiveness:

8) Has pricing been an effective incentive for water conservation?
X YES _____ NO

Explain Since the early 1980's there has been a decline in water usage. This has been driven by changing industrial make-up and price. Most industrial accounts have undergone conservation measures.

PRICING continued...

Shortcomings:

9) What problems are there associated with changing the price structure, price level or billing period?

Increased frequency of reading is aimed at identifying problems sooner and budgeting water costs for consumers.

Cost: (include direct cost and labor cost)

10) Estimate how much is spent on the pricing system per year $ VARIES

Costs are included in these for metering.

BRIEFLY REVIEW WHAT YOU HAVE DONE, AND DESCRIBE WHAT YOU PLAN TO DO:

Future Efforts:

11) What are the long-range goals for pricing water?

- to maintain current level of water use and avoid use of M.W.R.A. or need for new source of supply.
- to maintain annual capital improvements (1 million)

12) What measures will be taken to implement these goals?

Annual review of C.W.D. goals and budget preparation supports these goals.

13) Estimate the reduction in water use (MGD) that could be achieved if the measures listed above are implemented _____ MGD

Pricing and conservation are aimed at maintaing current usage. This is equivalent to 0.3 MGD/year in reductions.

14) What is the timetable for this, how will it be implemented and who will administer it?

These efforts are on going and administered by the Superintendent.

15) What is the approximate cost of these efforts and the funding source?

100% funded from water revenue.

Conservation Measure: PUBLIC EDUCATION/INFORMATION/PARTICIPATION

GOAL: Educate and inform the public about the proper and efficient use of water resources. Get public support for a conservation program

RECOMMENDED ACTIONS:

- An on-going education program which includes bill stuffers, school conservation curriculum, education program for municipal employees

- Consult with community leaders and interest groups that have concerns about water conservation

Past and Present Efforts:

1) Do you have an ongoing program to educate customers about water conservation? __X__ YES _____ NO

If YES, explain limited M.W.R.A. instruction of educators
- conservation materials mailed with bills
- notices on Cable T.V.
- Calls for volentary water restrictions

2) Do you encourage voluntary residential water saving habits?
__X__ YES _____ NO

Explain Cambridge Water Board publishes formalnotices during times of percipitation short fall.

3) Have you solicited public participation in a water conservation program ?
_____ YES _____ NO CURRENTLY UNDER EVALUATION

4) Have you encouraged industrial or commercial water reuse or recycling?
__X__ YES _____ NO through pricing.

Effectiveness:

5) Has your public education campaign been effective in reducing water consumption? _____ YES _____ NO

Explain _____

6) Are the education programs implemented on an on-going, day-to-day basis or during an emergency period or (both?) _____

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WATER DEPARTMENT
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Cambridge Water Department
Water Conservation Plan

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Conservation Measure: Pricing

- C.W.D. is maintained on a "full cost basis", all operating and debt cost are recovered by an annually adjusted water rate.
- C.W.D. (February 1989) has an increasing block rate structure, specifically aimed at water conservation.
- C.W.D. billing - twice annually being changed to quarterly.

PUBLIC EDUCATION/INFORMATION/PARTICIPATION continued...

Shortcomings:

7) List any problems associated with your public education campaign or public participation efforts
Customer accounts do not match up with consumers.

Cost: (include direct cost and labor cost)

8) Estimate How much is spent on public education/information/participation related to water conservation per year, include personnel costs (person weeks/year) $_____

BRIEFLY REVIEW WHAT YOU HAVE DONE AND DESCRIBE WHAT YOU PLAN TO DO:

Future Efforts:

9) & 10) What are the long-range goals for public education?
- to reach consumers directly - currently (3-89) investigating using Com Electric's billing package as a vehicle to reach consumers.

10) What measures will be taken to implement these goals? _____

11) Estimate the reduction in water use (MGD) that could be achieved if the measures listed above are implemented _____MGD

12) What is the timetable for this, how will it be implemented and who will administer it? These efforts are on-going

13) What is the approximate cost of these efforts and the funding source?
100% funding from water revenues.

Conservation Measure: DROUGHT AND EMERGENCY PRODEDURES/PLANNING

GOAL: Be prepared to handle an emergency. Augment supplies and/or reduce demand. Manage limited resources

RECOMMENDED ACTIONS:

- Adopt an emergency response plan which outlines who is responsible to do what, when, how and with what sources (see Appendix C for ideas).

- Adopt a progressively stringent reduction program indicating who will reduce where, how much, and how.

Past and Present Efforts:

1) Do you have a plan describing procedures for handling water emergencies? X YES _____ NO

If YES, briefly outline the plan (or attach it)
Previous efforts have been Water Board requested voluntary water restrictions and reliance on the M.W.R.A. (than MDC) system for drought supply.

2) Do you have a written procedure which outlines which users will be cut back, when, how and how much in the event of a water emergency?
X YES _____ NO Developed March 1989

3) List the emergency water supplies that would be available for use, and the approximate amount of water available (MGD)

Emergency supply source	Amount (MGD)
MDC/MWRA	Historically has met system demand.

4) List any interconnections with adjacent communities, and their capacities

NONE

5) Describe how essential services will be maintained in the event of an emergency Cambridge back up is the MDC/MWRA system C.W.D. will depend on MDC/MWRA for short falls - CWD safe yield estimated at 13 MGD

DROUGHT AND EMERGENCY PROCEDURES/PLANNING continued...

Effectiveness:

6) Can this system adequately handle a short-term emergency ? (for example, a seasonal drought) __X__ YES _____ NO

Explain MDC/MWRA system may be manually or automatically engaged and has the capacity to supply the whole system.

7) Can this system adequately handle a long-term emergency ? (for example, a contamination incident that shuts down over 50% of the water supply system)

__X__ YES _____ NO

Explain This is and has been the long term assumption and reason for the Cambridge Membership in the "metropolitan rate district"

Shortcomings:

8) What problems are associated with establishing emergency procedures?

Outside use small part of total consumption.

Cost: (include direct cost and labor cost)

9) Estimate how much money is spent per year on developing and/or maintaining the emergency plan/procedures? $_____

BRIEFLY REVIEW WHAT YOU HAVE DONE, AND WHAT YOU PLAN TO DO:

Future Efforts:

10) Describe any future efforts related to emergency procedures and emergency planning

- establish direct contact with consumers
- establish list of industrial/commercial users to allow direct contact.

Conservation Measure: EFFICIENT WATER FIXTURES/OTHER MEASURES

GOAL: Reduce the amount of water used

RECOMMENDED ACTIONS:

- actively enforce the building and plumbing code for new construction and substantial rehabilitation
- retrofit public buildings with water saving devices
- consider long-term water conservation measures (see Appendix D)
- retrofit residential and non-residential buildings with water saving devices

Past and Present Efforts

1) Have you distributed residential retrofit or water saving devices?
_____ YES ___X___ NO

(see Appendix D for information on retrofit and water saving devices)

Explain _____

2) Have water saving devices been installed in public buildings?
___X___ YES _____ NO reconstruction of old facilities has been to current plumbing code.

3) Is the plumbing code actively enforced where installation of water saving devices is required? ___X___ YES _____ NO

4) What is the residential gallons per capita per day figure ? ___80___ gpcd

5) Have you distributed public information on water saving devices ?

___X___ YES _____ NO

6) Have you made any effort to reduce outdoor water use (residential and agricultural) ? ___X___ YES _____ NO
Explain MWRA literature distributed and a specific request for voluntary water restriction.

7) Have you contacted large users or industries about reducing water use (recirculation, reuse, or process modification)
_____ YES ___X___ NO current goals

8) Have you considered other types of water reuse (such as: using sewage effluent to water parks or golf courses, cool power plants or be used by industry; making changes to the plumbing or health code to allow the use of greywater (ex. bathwater) to be used to flush toilets or for outdoor use ?
___X___ YES _____ NO Pricing has driven large volume users to conserve and re-use water.

EFFICIENT WATER FIXTURES/OTHER MEASURES continued..

Effectiveness: N.A.

9) Has your campaign to use water efficient fixtures been effective ?
_____ YES _____ NO
Explain _____

Shortcomings:

10) List any problems associated with implementing these measures
Code enforcement is not done by the Water Department

Cost:

11) Estimate how much is spent on implementing efficent water fixtures per year
$ _____

Future Efforts:

12) What are the long-range goals related to installing efficient water fixtures ?

13) What measures will be taken to implement these goals?

14) What is the timetable for this, how will it be implemented and who will administer it ?

15) What is the approximate cost of these efforts and the funding source ?

INCLUDE ANY ADDITIONAL INFORMATION ON CONSERVATION MEASURES
NOT COVERED BY THIS QUESTIONNAIRE ON ATTACHED SHEETS

CITY OF CAMBRIDGE

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March 1989

Conservation Measure: Protection

- C.W.D. (with MWRA) hascontracted with M.A.P.C. to prepare an in depth "Watershed Protection Document" which will; identify critical water resources areas, inventory present zoning limitations, inventory land use and hazards (available January 1990).

Conservation Measure: PROTECTION

If you are a community water supplier and your community has completed a "Concept Plan for the Protection and Management of Water Resources " (WRC questionnaire, Component 3 of a Local Water Resources Managment Plan) this section does not need to be completed.

GOAL: Protect existing and future water supply sources

RECOMMENDED ACTIONS:

- Identify critical water resource areas (recharge areas to wells, watersheds)
- Acquire land or development rights to these areas
- Adopt zoning to protect these areas
- Adopt local by-laws for control of underground storage tanks, hazardous materials, road salt, erosion
- Inventory land uses in critical water resource areas
- Set up a water resources protection committee
- Begin an education program to increase awareness of the relationship between land use and water quality impacts

Past and Present Efforts:

1) Have aquifer recharge areas or critical watershed lands been identified ?
X YES _____ NO Explain on-going MAPC study (1989(will provide detailed outline of the above.

2) Have aquifer recnarge areas or critical watershed lands been acquired by purchase? X YES _____ NO

If YES, list the amount and percentage of acreage owned
C.W.D. owns perimeter of its two supply reservoir (5% of total watershed)

3) Have aquifer recharge areas or critical watershed lands been protected through the purchase of development rights or zoning?

Explain Fresh Pond watershed 100% owned by city the other watersheds are in other towns, zoning not controlled by Cambridge.

4) List the various measures that are in place to protect your existing and future water supplies (include measures taken in adjacent towns, if applicable)
Lexington has Town Wetlands by-law that extend the scope of watershed protection.

Lincoln "requires" a 50 foot buffer zone set back and is implimenting watershed protection by-laws Weston is implimenting watershed protection by-laws, Waltham is allowing development that is inconsistent with watershed protection.

PROTECTION continued...

Effectiveness:

5) How effective are these protection measures? Give specific examples if possible Variable from town to town to city.

Shortcomings:

6) What problems does your system face in protecting existing and future water supplies?
- inconsistent standards of protection provided by the watershed communities.
- MDPW routinely grossly polluting the water supply.

Cost:

7) How much money is spent per year on protection of the water supply resource? $100,000

Describe what these costs are:

Future Efforts: (use additional sheets if necessary)

8) What are the long-range goals related to water supply protection ?
- provide uniform, clearly recognized, goals and standards for watershed protection, including specific standards for project review.

9) What measures will be taken to implement these goals?
- 1989 MWRA/CWD/MAPC watershed protection study.

10) What is the timetable for this, how will it be implemented and who will administer it?
Study report due 12-89, implimentation of recommendations will depend on watershed communities or on the passage of protection legislation.

11) What is the approximate cost of these efforts and the funding source?
Current study = $40,000

Plan of Action: Water Conservation Efforts

Describe briefly your "plan of action" as related to water conservaiton efforts. What are your top priority activities, how will they be implemeted, what is the timetable and funding source.

Activity	Implementation	Timetable	Funding source
(SEE ATTACHED PLAN)			

CITY OF CAMBRIDGE

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"WATER CONSERVATION PLAN"

DRAFT

Preamble

The City of Cambridge has a limited supply of water to meet the demands of its residential, commercial, industrial and institutional customers. There is no immediate danger of the Water Department being unable to meet these consumption demands except during an extended drought period, or during the aftermath of a contamination incident within the reservoir system. The water supply system of the City can be supplemented with water purchased from the Massachusetts Water Resources Authority (M.W.R.A.) during periods of emergency conditions.

Conservation Goal

The specific goal of the Cambridge Water Department "water conservation plan" is to maintain an adequate supply of high quality water for all its customers and to minimize the amount of water purchased from the M.W.R.A. Additional objectives include: reducing the average daily summer demand, reducing the average annual usage for all existing customers, and eliminating the need for developing new sources of water supply. These goals and objectives can be achieved most effectively through a combination of a "supply management program" and a "demand management program".

Supply Management Program

This on-going program has been designed to improve the efficiency and reduce "unaccounted-for water" within the production and delivery systems. It is not dependent on the response of water users. Typical

components of a "supply management program" are listed below, along with information applicable to the Cambridge Water Dept. (C.W.D.).

S1 - Metering

The C.W.D. maintains water meters in all residential, commercial, industrial, and institutional buildings. Water bills are issued semi-annually.

DRAFT

S2 - Leak Detection & Repair

The C.W.D. repairs service connection leaks and water main breaks on a routine basis. A system-wide sonic listening survey for underground leaks was conducted in 1984.

S3 - Pressure Reduction

Since 1980, all water processed at the Water Treatment Plant has been pumped directly to the elevated storage/distribution reservoir at Payson Park in Belmont. The water returns to Cambridge by gravity flow, which produces a distribution system pressure range of 52 to 56 p.s.i. Prior to 1980, water had been pumped directly into the distribution system, which resulted in a higher system pressure in the 60 to 65 p.s.i. range. By reducing system pressure, the flow available from sink faucets and outside hose connections is reduced accordingly.

S4 - Watershed Protection

Since 1979, the C.W.D. has employed a full-time Manager of Water Resources to implement and control watershed management techniques that will protect the quality of existing supplies and maximize the recharge flows into the three reservoirs.

S5 - Evaporation Suppression

This program is not considered cost-effective in this geopraphical region; consequently, it is not applicable for Cambridge.

Demand Management Program

This program can be designed to achieve immediate water use reduction, and it is quite dependent on the response and co-operation of

of the water users. Typical components of a "demand management program" are outlined below, along with information on their status in Cambridge.

DRAFT

D1 - Pricing

The C.W.D. historically as charged for water based on a uniform flat rate pricing structure. In response to an increasing need for water conservation and a limited amount of supply, the Department recently completed a Water Rate Study that evaluated a pricing structure based on an increasing block rate structure. This form of a rate structure provides the greatest incective for water conservation.

D2 - Regulation

This program can be used to achieve immediate, short-term water conservation. Regulations can be in the form of "voluntary" or "mandatory" restrictions of outside use of water (i.e. car washing, irrigation, spray fountains, etc.), and in the form of mandatory water conservation requirements for plumbing fixtures, once-thru cooling water, and flow restriction limits on household appliances.

D3 - Public Education

This program must be specific to the City of Cambridge, which is a large urban area. Methods available for water conservation education include: bill inserts, pamphlets, newsletters, school programs, television, and direct customer assistance. Because many residents of Cambridge do not receive an actual water bill, the City cannot rely on bill inserts. Methods of public information more applicable to Cambridge are water conservation kits, television, and school curriculum.

Water Conservation Plan

PART II COMMUNITY SUMMARY AND OVERVIEW

COMMUNITY Cambridge
DATE 3-22-89

CONTACT NAME Timothy W.D. MacDonald
ADDRESS, PHONE C.W.D. 250 Fresh Pond Pkwy. Cambridge, MA. 02138 (498-9070)

SECTION 1 - Summary of Water Conservation Plan

1a) List the public water suppliers (public agencies or private companies) which serve your community

Cambridge Water Department
Full Member "metropolitan water district" 100% backup supply

1b) List any major water user(s) (greater than 100,000 gpd) in your community that are not connected to a public water system.

No none- connected users which require registration or permit under water Management Act.

1c) Provide a brief analysis of water conservation efforts in your community, and explain the role water conservation plays in your overall water resources management plan

C.W.D. conservation efforts, specifically pricing-increasing, block rate, is directed a limiting increase in demand. This to avoid purchase of MDC/MWRA water and to avoid funding addition supply.

Section 1. continued

1d) Has your community adopted enabling legislation (MGL Chapter 40 Section 39k) to allow for the establishment of enterprise accounts? (see Appendix F for the legislation and information on enterprise funds).

_____ YES ___X___ NO If NO, is this being considered? ____

Has it been considered and rejected? _____ YES _____ NO

Explain The C.W.D. maintains 100% funding of its cost through the rate structure and an established "Water Fund"

Section 2 - Assessment

2a) Review of water supply and demand data.

List those water suppliers in your community which are unable to meet the projected future demand for water. Refer to the 1982 DEM, DWR water supply questionnaire (updated in 1985), page 10 for 1990 projections. Water demand projections to the year 2020 are being prepared by the Department of Environmental Management, Division of Water Resources as part of the river basin planning effort. To find out what projections are available in your community contact the Division at (617) 727-3267 or the WRC at (617) 727-9800

Do the water demand projections seem realistic?

___X___ Yes _____ No

Explain: C.W.D. has made a permit request based on the 1988 projection updated to include the demand of more recent development. The projected demands are within the historical yield of the supply system and the MDC/MWRA is considered an alternate or backup supply for long term or short term short falls.

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Four

Phone Number: (617)-498-9070 Date: March 1989

Public Awareness and Education Strategy
for

CAMBRIDGE, MA.

Pursuant to MWRA/MDC declaration of Water Emergency February, 1989

B. Strategy for keeping public informed of drought situation:

1) Public Notices Published in Cambridge Tab and the Cambridge Chronicle (display ads)

2) Notices on Cable TV bulletin board

3) Notices in water bills (twice a year or quarterly)

4) Notices with Com Electric's monthly bills.
(under discussion with Com Electric 3-89)

5) Will make media contact on weekly basis ie reservoir status and requried or requested conservation measures.

6) All notices reference department phone number-printed materials on water conservation available on request.

7) Routine supply status reports to Cambridge City Manager, Cambridge City Council, and Cambridge Water Board.

8) Distribute handout materials thru school system.

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Five

Phone Number: (617)-498-9070 Date: March 1989

Large Water Users
in

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1989

C. List users > 50,000 gpd averaged over any month or 20 million gallons per year:

Name	Address	Contact	Phone

PERFORMANCE INDICATORS - FY88		TOP TWENTY ACCOUNTS	CONSUMPTION (Mil. Gal./Year)
1. M.I.T.	589.92	11. Charles Hotel	28.23
2. Harvard University	396.28	12. Marriott Hotel	27.39
3. Cambridge Electric	144.19	13. Biogen	24.98
4. Mt. Auburn Hospital	80.14	14. Whitehead Inst.	23.17
5. Deran Confectionary	63.74	15. Draper Labs	21.48
6. Polaroid	62.40	16. Genetics Inst.	18.60
7. Nabisco	47.19	17. Hotel Sonesta	18.19
8. Arthur D. Little	37.31	18. Museum of Science	15.79
9. Hyatt Regency Hotel	34.08	19. U.S.D.O.T.	13.48
10. NECCO	29.78	20. Dade Clinical	13.42

(SEE ATTACHED SHEETS: 5A & 5B)

CITY OF CAMBRIDGE

MASSACHUSETTS

WATER DEPARTMENT
250 FRESH POND PARKWAY
CAMBRIDGE, MASS. 02138

617-498-9070

1)	M.I.T.:	Building E18-260 c/o Roger Moore 400 Main St. Cambridge, MA. 02142	(253-2835)
2)	Harvard University:	Utilities Plant c/o Paul Mark 1 Oxford St. Cambridge, MA. 02138	(495-1000)
3)	Cambridge Electric:	Attn: Donald Trischitta 2421 Cranberry Highway Wareham, MA. 02571	(508-291-0950)
4)	Mt. Auburn Hospital:	330 Mt. auburn St. Cambridge, MA. 02138	(492-3500)
5)	Deran Confectionary:	Sultana REalty Trust Borden Inc. Attn: Carl Peterson c/o Deran Confectionary 134 Cambridge St. Cambridge, MA. 02141	(498-0500)
6)	Polaroid Corp.:	119 Winter St. Cambridge, MA. 02139	(577-2000)
7)	Nabisco:	810 Main St. Cambridge, MA. 02139	
8)	Arthur D. Little:	c/o Timothy White 20 Acorn Park Cambridge, MA. 02139	(864-5770)
9)	Hyatt Regency Hotel:	Attn: John McCurk Engineering Department 575 Memorial Drive Cambridge, MA. 02139	(492-1234)

10) NECCO: 254 Mass. Ave. (876-4700)
Cambridge, MA. 02139

11) Charles Hotel: c/o Gene Hadleg (864-1200)
Asst. Chief Engineer
1 Bennett St.
Cambridge, MA. 02138

12) Marriott Hotel: Attn: Robert Cambell (494-6600)
Division of Engineering
2 Cambridge Center
Cambridge, MA. 02142

13) Biogen: Boston Properties (864-8900)
Building Leasing
c/o Fran Handon
14 Cambridge Center
Cambridge, MA. 02142

14) Whitehead Inst.: Boston Properties (258-5129)
c/o Whitehead Institute
9 Cambridge Center
Cambridge, MA 02142

15) Draper Labs: Attn: Diane Centofante (258-1000)
MS#78
555 Technology Square
Cambridge, MA. 02139

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Six

Phone Number: (617)-498-9070 Date: March 1989

Enforcement Authority
in

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1989

D.1 Reference Local Bylaw: City of Cambridge Ordinance Chapter 19 Article I Water Board 519-18 and 19-19 (attached)

D.2 If you have authority to collect fines or to ticket for violation of water use regulations, please quote bylaw:

As above, not to exceed fifty ($50) dollars.

D.3 Enforcement Strategy:

- Which community employees will be responsible for enforcement of water use regulations?

C.W.D. - meter readers and billing staff will monitor water use. By City Ordinance the Cambridge Water Board will hire Police Department special details for enforcement.

-What enforcement actions will they take?

Warnings and fines

-Where will telephone complaints be received?

C.W.D. business office.

-How will you respond to complaints?

Consumer contact will be made by C.W.D. and Police will be notified for enforcement.

shall not be let on again except by a vote of the Board and the payment of such fine, not exceeding Fifty ($50.00) Dollars, as the Board may impose.

(G.O. 1943, Ch.36, §18.)

Sec. 19-18. Board to decide what is waste or improper use.

The Board shall have the power to decide what shall be considered a waste or improper use of water, and to restrict the use thereof when it may deem necessary; and if the water-taker refuses or neglects to comply with any order of the Board, after notice given to him, the water may be cutt off, and shall not again be let on, except by a vote of the Board, and the payment of such fine, not exceeding Fifty ($50.00) Dollars, as the Board may impose.

(G.O. 1943, Ch.36, §19.)

Sec. 19-19. Restricting use of hand-hose.

The Board shall have the power to restrict the use of hand-hose or automatic sprinkler or similar devices to such hours of the day as it may deem necessary; and for any violation of such restriction the occupant of the premises shall be liable to the penalties imposed in the preceding Section for a waste or improper use of water.

(G.O. 1943, Ch.36, §20.)

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Seven

Phone Number: (617)-498-9070 Date: March 1989

Contingency Plan To Limit Consumption To

No More Than 5% Above 1988

in

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1989

E.1 List both Action and Impact on Water Use (be specific):

Action	Impact On Water Use

The C.W.D. does not anticipate a 5% increase in water use in 1989.

- This is in line with historical trend of annual water use.
- Support by public awareness of general water supply problem (MWRA 1989)
- C.W.D. increasing block rate, effective July 1989.

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Eight

Phone Number: (617)-498-9070 Date: March 1989

Contingency Plan To Limit Consumption To

No More Than 1988

in

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1989

E.2 List both Action and Impact on Water Use (be specific):

Action	Impact on Water Use

As with E.1 the C.W.D. anticipates no increase in water use:

This is supported by historical water use patterns and further supported by Changes in pricing structure ie increasing block rate structure.

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Nine

Phone Number: (617)-498-9070 Date: March 1989

Contingency Plan To Limit Consumption To

At Least 5% Below 1988 (see page 9A)

in

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1989

E.3 List both Action and Impact on Water Use (be specific):

	Action	Impact on Water Use
I	Cambridge Water Board will formally request Voluntary Water Restrictions.	
II	C.W.D. will increase consumer awarness of water use, its shortage, and conservation through public information and education. a) formal notices in papers (Tab and Cambridge Chronicle) and on Cable TV. b) C.W.D. will maintain contact and hold briefings with the above. c) C.W.D. will make regular formal reports on supply status to the Cambridge City Council and City Manager. d) formal contact will be made with industrial/commercial account outlining the water supply situation with reference to possible specific restriction.	
III	C.W.D. will ban hydrant rentals-will sell water only through metered hydrants at C.W.D. and C.P.W.D.	

(records indicate that in 1985 Voluntary water restrictions resulted in a 10% seasonal use reduction)

CITY OF CAMBRIDGE

MASSACHUSETTS

WATER DEPARTMENT
250 FRESH POND PARKWAY
CAMBRIDGE, MASS. 02138

617-498-9070

User class	Percent	MGD	reduction 5%	10%	15%
Residential	4.50%	7.4 (81 gpc)	7.0 (77 gpc)	6.7 (73gpc)	6.3 69gpc)
Residential/ Commercial	2.5%	0.4	0.4	0.4	0.3
Institutional	21.5%	3.5	3.3	3.2	3.0
Commercial	17.0%	2.8	2.7	2.5	2.4
Industrial	14.0%	2.3	2.2	2.1	2.0
TOTAL		16.5	15.7	14.9	14.0

March 1989

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Ten

Phone Number: (617)-498-9070 Date: March 1989

Contingency Plan Limit Consumption To

At Least 10% Below 1988

in

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1989

E.4 List both Action and Impact on Water Use (be specific):

	Action	Impact on Water Use
	10% Below 1988	
I	Cambridge Water Board will formally declare Mandatory Water Restrictions a) alternate day irrigation/outdoor water use restrictions will be established. b) Cambridge Water Board will request police details to issue warnings. C.W.D. will followup with supporting information.	
II	increased public information and education a) formal conservation displays will be established city wide b) continued media contact will be maintained.	
III	leak detection and repair will be given priority over service renewals.	

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Eleven

Phone Number: (617)-498-9070 Date: March 1989

Contingency Plan To Limit Consumption To

At Least 15% Below 1988

in

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1989

E.5 List both Action and Impact on Water Use (be specific):

	Action	Impact on Water Use
I	Cambridge Water Board will request the Police details to enforce outside water use restriction with citations.	
II	C.W.D. will continue public information and education. a) continued media contact will be maintained b) C.W.D. will make available home water conservation kits, to include water saving devices.	
III	Municipal water uses will be limited a) park irrigation will be reduced by half b) street cleaning will be halved. c) vehicle washing will be prohibited d) Fire Department use of water for training will be restricted to the Fresh Pond C.W.D. location only.	
IV	C.W.D. will continue focus of leak repair before service renewals.	

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Twelve

Phone Number: (617)-498-9070 Date: March 1989

Use Restriction Response Plan
for

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1989

F. Describe how your community would enforce...

- A ban on outdoor watering between 8 a.m. and 6 p.m.:

By City ordinance, the Water Board would employee special details from the Police Department to enforce any restriction put in place by the Board

(see attached sheet 12A)

- A ban on the use of ornamental fountains utilizing potable water:

AS ABOVE

agents. In case of his absence or inability, his duties may be performed by a president pro tempore, to be chosen by the Board. (G.O. 1943, Ch.36, §5.)

Sec. 19-4. Powers of Board.

The Board, so constituted and organized, shall have and exercise all the powers vested in the City Council by any Acts of the Legislature now or hereafter in force so far as the same can be legally delegated, and it may appoint a Chief Superintendent and all other subordinate agents and assistants, and fix their compensation and that of the Clerk before mentioned excepting those for police service. When such services are required, the Water Board shall apply to the Chief of Police for a detail of as many officers as it requires for patrol service and while in the employ of said Board the officers shall be under the control of the Water Board, and shall be paid by the Board.
(G.O. 1943, Ch. 36, §3.)

Sec. 19-5. Repairs of pipes, etc.

The Board shall have full power to make all necessary repairs, extensions or improvements on said works, and to provide new supply-pipes. All hydrants, stand-pipes and drinking fountains, established by the City, shall be constructed, and all repairs upon such hydrants, stand-pipes and drinking fountains made, and the streets, when broken up, shall be again put in good order, to the satisfaction of the Superintendent of Streets,

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Thirteen

Phone Number: (617)-498-9070 Date: March 1989

Fire Protection Plan
in

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1989

G. Please list anticipated problems and responses:

- The C.W.D. manages the finished water reservoir-Payson Park-to maintain adequate fire protection volume. During emergency conditions or during long term drought, the reservoir would be maintained above a minimum elevation of 6 to 10 feet. If the C.W.D. supply falls short, the MDC/MWRA system would be activated to maintain the storage volume at or above the minimum elvel.

- in the event of a total failure of the supply the Cambridge Fire Department currently has the capacity to relay water with 4" diameter hoses and pumper up to 3/4 of a mile from surface water bodies.

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Forteen

Phone Number: (617)-498-9070 Date: March 1989

Local Sources
Abandoned or Standby
for

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1988

H. List abandoned sources or sources on standby:

Source	Status	Evaluation of Potential for Reactivation

- Cambridge has no abandoned water supply sources that are inter connected to the supply system.

- Cambridge has a historic and legal (as a full member in the "metropolitan water district") connection with the MDC/MWRA water system. This connection has and will provide Cambridge with backup or standby water supply.

15

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Fifteen

Phone Number: (617)-498-9070 Date: March 1989

Planned Maintenance
Calender Year 1989
for

CAMBRIDGE

Pursuant to MWRA/MDC Declaration of Water Emergency February, 1989

I. List Planned maintenance projects which could result in above normal water use, including flushing, and projects which could aggrevate emergency situation:

Project	Schedule

There are no planned maintenance projects which will impact water use for 89-90.

Municipality: CAMBRIDGE

Contact Person: Timothy W.D. MacDonald Page: Sixteen

Phone Number: (617)-498-9070 Date: March 1989

For Partially Supplied Users
in

CAMBRIDGE

Pursuant to MWRA/MDC Declartation of Water Emergency February, 1989

J.1 Evaluation of Status of Active Local Sources: (March 20, 1989)

In response to below normal precipitation, the Cambridge Water Board has (2-2-89) call for Voluntary Restriction on water use. Present supply levels (3-20-89) are at 90% of seasonal capacity. Seasonal capacity has drop steadily from 105% in Dec. 1988 to the 90% current level. Current total system storage volume is 71% or 2795 MG. This storage volume has remained steady since Dec. 1988.

J.2 Percent of Water Needed from MWRA to Meet 1989 Demands:

- If Cambridge system fails ie runs dry 17 to 23 MG would be needed.

- In drought conditions C.W.D. may produce 13 MG and MWRA would be expected to supply the rest.

6

CITY OF CAMBRIDGE

CAMBRIDGE, MASSACHUSETTS 02139
TEL. 498-9011

EXECUTIVE DEPARTMENT
ROBERT W. HEALY
City Manager

RICHARD C. ROSSI
Deputy City Manager

April 3, 1989

To the Honorable, the City Council:

With respect to Awaiting Report Item No. 34 relative to water conservation, the Cambridge Water Department has prepared a "Drought Contingency Plan" which includes a "Water Conservation Plan" for the City. This plan outlines specific conservation measures in these areas:

Metering
Water Audit, Leak Detection & System Rehabilitation
Pricing
Public Education - Information - Participation
Drought & Emergency Procedures - Planning
Efficient Water Fixtures - Other Measures
Protection.

Since the plan is subject to approval by the M.W.R.A. and D.E.Q.E. it is still considered to be in the draft stage. A copy is on file with the City Clerk.

Very truly yours,

Robert W. Healy
City Manager

RWH/mbf

Agenda Item No. 6 S-236

Re: response to Awaiting Report Item 34, on a water conservation plan, enclosing a draft Drought Contingency Plan.

In City Council,

April 3, 1989

4-3-89
Placed on File.