LEAD IN DRINKING WATER:

ANALYSIS OF A COMPLIANCE PROJECT FOR NTNC SCHOOLS

by

Debra L. Northrop

B.A. Asian Studies, Pennsylvania State University
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Signature of Author _____
Department of Urban Studies and Planning
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Certified by _____
H. Patricia Hynes
Professor, Department of Urban Studies and Planning
Thesis Supervisor

Accepted by _____
Donald Schon
Chairperson of the Masters of City Planning Committee

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ABSTRACT

This thesis analyzes the Lead in NTNC School Drinking Water technical assistance program, conducted by the Department of Environmental Protection, Division of Water Supply (DEP/DWS) and developed, coordinated, and managed by the author of this thesis. NTNC (Non-Transient Non-Community) water suppliers provide water to non-residential populations of 25 or more of the same persons for over six months a year. There is no upper size limit for NTNCs. NTNC water suppliers have only recently been more stringently regulated by the US Environmental Protection Agency, and are usually untrained as drinking water suppliers. NTNCs are unaccustomed to complying with any but the most basic of drinking water regulations and are usually unprepared both financially and technically for more complex regulations. This technical assistance program served as a pilot project to determine how to work with NTNC water suppliers. The project, which was to provide technical assistance for lead testing to NTNC schools, was found by DEP/DWS to be successful, judged by the number of NTNC schools which submitted results or attended technical assistance sessions. However, the methodology for compliance could make more efficient use of DEP/DWS or school representatives' time and could be improved to more adequately provide for the needs of NTNC water suppliers. Recommendations for this improvement are drawn from a comparison made with similar programs conducted by the Rural Water Resources Program, the Northeast Rural Water Association, and the DEP Division of Hazardous Waste.

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CHAPTER I

INTRODUCTION

Regulators of public water supplies face a significant problem in the 1990's. Non-Transient Non-Community (NTNC) water suppliers, serving non-residential populations of 25 or more of the same people over six months of the year, will be increasingly regulated under the Federal Safe Drinking Water Act (SDWA) and the State Drinking Water Regulation. These regulations will require testing for an increasing number of contaminants, and the costs associated with this testing will increase proportionately.

Previously, all Non-Community systems had few testing requirements. The US Environmental Protection Agency (EPA) has only recently designated NTNCs as a distinct group which consistently serves a population. Because of this recent change in NTNC status, states are relatively unprepared and lack programs to gain compliance from these many small and inexperienced water suppliers.

This thesis will describe and analyze the results from a pilot program conducted by the Massachusetts Department of

Environmental Protection, Division of Water Supply (DEP/DWS), the agency that provides technical assistance for NTNC schools to analyze their drinking water system for lead contamination. This effort to provide specialized assistance for NTNC schools was not required of DEP/DWS by EPA at this time. This project was initiated by DEP/DWS to get an early start on determining how to best work with NTNCs. No other state has tried a similar pilot project to date. The results of this analysis will determine how DEP/DWS will work with NTNCs to gain compliance with future requirements.

Political Background

The EPA is under congressional order to increase the number of contaminants regulated by the Safe Drinking Water Act. Eighty-three contaminants, including the 26 contaminants already regulated by EPA, were to be regulated by June 1989. By the end of 1991, EPA is required to have 25 more contaminants regulated, with an additional 25 regulated every three years after (AWWA 1987, US EPA 1989b).

The regulations, which will control the amount of these contaminants allowed in all public water systems, will require nearly the full concentration of resources available from the Massachusetts Department of Environmental

Protection, Division of Water Supply (DEP/DWS). Because of the depressed fiscal situation in Massachusetts in 1990, the state has reduced the already small Division of Water Supply, Water Quality Assurance staff. Additional hires, even for the purpose of handling an increasing workload, are impossible at this time. This situation has necessitated the temporary inactivity of non-priority drinking water programs such as the road salt program.

Public water suppliers will be affected financially by this situation. Testing requirements and the costs associated with them will increase, but there will be no corresponding increase in state funds to help them meet the additional testing demands. Small Non-Transient Non-Community Water Suppliers, which are only now becoming more regulated and usually have the smallest financial base, will feel this financial burden the most keenly. The DEP/DWS, and other state regulatory agencies, will in turn become increasingly burdened because of this group's potential inability to comply with state and federal regulations.

Background of the Pilot Project

This thesis will look at how the Massachusetts Department of Environmental Protection, Division of Water Supply, should gain compliance from Non-Transient Non-Community

water suppliers. The specific pilot project to be analyzed concerns testing for lead contamination in the drinking water systems of NTNC schools.

NTNC water suppliers represent the category consisting of the very smallest public water suppliers. A NTNC public water supplier serves a non-residential population of 25 or more people, or 15 or more service connections, 6 months or more a year. The population served at the location can be very large and, if non-residential, still be considered a NTNC water system. NTNC water suppliers generally lack the appropriate staff, training, and funding necessary to meet the Safe Drinking Water Act standards. These standards are deemed necessary by the US Environmental Protection Agency and Massachusetts Department of Environmental Protection to provide safe water for people to drink.

Working with NTNCs, made up primarily of schools, industries, and hotels with their own wells, is difficult because they never really wanted to be regulated water suppliers. The head of a NTNC water system may be a school principal, a business manager, or a corporate CEO. These people do not have the training to run a public water supply. These people never expected they would be required to meet the requirements of the Federal and State Safe Drinking Water Acts.

NTNCs were identified by the 1986 SDWA amendments for more stringent regulation. Non-Transient Non-Community water suppliers were previously considered only as Non-Community water suppliers and were only minimally regulated. Because the entities comprising NTNC systems consistently served water to the same non-residential population, these people were considered to be at higher risk to water contamination than transient non-residential populations due to exposure rates. EPA began to more stringently regulate NTNC systems in 1986. State agencies were required to identify NTNCs from their existing databases of Non-Community systems. Massachusetts was one of the first states to complete this designation in 1988.

NTNCs are currently required to monitor for coliform bacteria, nitrate, and sodium only. These are the most basic and simplest of sampling requirements and represent only a small subset of the testing requirements for residential drinking water systems. NTNCs will eventually be required to meet all requirements that residential systems must currently meet. As new requirements are phased in, such as the proposed lead standard, both the NTNC water suppliers and DEP, Division of Water Supply, will go through a learning process of how to best work with one another.

Because NTNCs have little experience and knowledge as water suppliers, the question at DEP, Division of Water Supply, is how to bring this group into compliance with EPA requirements. Being in compliance includes: 1) having a water supply that meets locational and technical requirements, 2) completing required monitoring procedures as scheduled by EPA and DEP regulations, 3) notifying customers of any water system violations, and 4) having adequate staffing. Currently, the DEP is developing a generic process for use in bringing NTNC water suppliers into compliance with new SDWA monitoring requirements. My work with lead contamination in schools drinking water is a component of this process.

All NTNCs were required to post a standardized notice on lead contamination and drinking water at each site, by June 19, 1988. Also in 1988, all NTNC schools were sent an information package explaining the EPA proposed lead in drinking water standard of 20 ppb (parts per billion) and a recommendation to begin evaluating their water supply system in anticipation of this proposed change.

In September 1989, I began working with DEP/DWS to conduct a pilot project with NTNC schools. The regulatory focus of the project was to help bring NTNC schools into compliance for the lead testing requirements in both the

Lead Contamination Control Act and the proposed Lead and Copper Rule. The additional goal of DEP/DWS was to see what method of assistance would encourage the greatest compliance from NTNC water suppliers.

The DEP/DWS pilot project involved instructing schools, through a letter sent in November 1989, to test their water system for lead. This letter was followed by individualized technical assistance sessions, scheduled in January 1990, to help school representatives accurately interpret the complex test results from their sampling procedure and ensure that they choose an appropriate way to modify their plumbing system, should this be necessary.

Individualized technical assistance sessions, scheduled for an entire group of water suppliers, had never been tried at DEP, Division of Water Supply. The motivation for this approach was the belief that NTNC water suppliers need extra help and support with interpreting their sampling test results. Representatives from DEP/DWS met with school representatives for 1/2 to 1 hour individualized sessions scheduled for one day in January 1990, at each DEP regional office.

Goal of this Thesis

My responsibilities were to plan, coordinate, and enact this project for lead testing in NTNC schools. In this thesis, I will describe the design of this pilot project for lead, analyze the project results, and determine whether this form of individualized technical assistance will be helpful to DEP/DWS in gaining compliance from NTNC public water suppliers with other State requirements. I will then recommend an approach for the future.

Importance of this Work

This project is important to look at because it is one of the first attempts to work with NTNC public water suppliers, and is the first attempt of DEP/DWS to provide personalized technical assistance. Because NTNC water suppliers were only identified in 1988, many still do not understand their obligation to comply with state and federal Safe Drinking Water Act rules. NTNCs have not yet fully realized that they must budget for increased SDWA testing requirements. Some of these rules may require serious modifications to their water supply system.

Lead is just one of the contaminants for which NTNCs must monitor. In 1991, NTNC testing responsibilities will be expanded to include many contaminants already tested for by

residential public water suppliers on a regular basis. Eventually, NTNCs will be required to conduct testing for all contaminants regulated by the EPA. This will be complicated and expensive. The results of this pilot project will determine how the DEP will work with NTNCs to gain compliance with future requirements.

While my research is based on specific events and conditions in Massachusetts, it will also be applicable to other states in which similar conditions may exist. All NTNCs in all states will be required to comply with EPA and state standards. No other state has yet developed a method to achieve this compliance.

Outline of Thesis

Chapter II of this thesis provides an overview of the hazards of lead consumption and the regulations that specifically regulate lead contamination in drinking water. It provides a detailed profile of NTNC water suppliers, particularly the schools targeted for this program.

Chapter III looks at other technical assistance and compliance programs that have worked with populations similar to, or the same as, NTNC water suppliers. One program examined is conducted by a non-profit organization that works with NTNC water suppliers. The other is a state

agency program that has gained a large amount of voluntary compliance from a population similar to NTNCs.

Chapter IV analyzes the components of the DEP/DWS Lead in School Drinking Water program and highlights the pilot program's problematic and successful features. I will look to see why schools attended the technical assistance sessions, how many submitted test results at the sessions or through the mail, and how closely these schools followed testing instructions. The program will not be analyzed by the number of water supply system corrections finally made, for that would require a much longer time span for analysis and is beyond the scope of this thesis.

Chapter V presents my recommendations for improving the training process for NTNC water suppliers. An important consideration is the time and financial cost to DEP/DWS. Because of the State fiscal situation in 1990, DEP/DWS cannot afford strategies that require large amounts of money or people. Technical assistance must be efficient in this aspect as well as effective.

CHAPTER II

REGULATORY BACKGROUND

This chapter will provide the background information necessary to understand why the Department of Environmental Protection, Division of Water Supply (DEP/DWS) conducted its technical assistance program to help Non-Transient Non-Community (NTNC) Schools analyze their plumbing systems for lead contamination. I will look at why lead consumption is a major health concern. The health effects of lead have prompted two federal regulations which require state environmental primacy agencies to confront the problem, and these will be described. I will then explain who NTNC schools are, and why the DEP/DWS program targeted this group.

Why is Lead a Problem?

Lead has been used as a plumbing material since Roman times. Rome's water distribution system was comprised primarily of lead. In fact, the word "plumber" is derived from the latin word "plumb," meaning lead (AWWA 1989). The health hazards which this lead plumbing could pose were not

recognized until more recently. In 1845, the Water Commissioners of Boston concluded, "Considering the deadly nature of lead poison, and the fact that so many natural waters dissolve this metal, it is certainly [in] the cause of safety to avoid, as far as possible, the use of lead pipe for carrying water which is to be used for drinking" (Report of the Commissioners to Examine the Sources from Which a Supply of Pure Water May Be Obtained for the City of Boston 1845).

Regardless, since lead is such a durable construction material, it has been used in plumbing materials until as recently as 1986. In fact, most plumbing and construction codes recommended or required the use of copper pipe joined by lead/tin solder before 1986 (US EPA 1986).

The ban on lead for use as a drinking water plumbing material was prompted by well documented research on the health effects of lead. Lead levels as low as 6-15 ug/dl (micrograms per deciliter, the measure used for blood lead levels) in children have been linked in numerous studies to damage of the central and peripheral nervous system, learning disabilities, shorter stature, impaired hearing, and impaired formation and function of blood cells. At extremely high levels, lead can cause death due to neurotoxicity and other pathophysiological changes. If

death does not occur, high lead levels can cause mental retardation and severe kidney disease (US EPA 1986).

EPA estimates that by lowering lead exposure in drinking water from the currently regulated level of 50 ug/l[1] to 20 ug/l, 29,000 fewer children will require medical treatment, 82,000 fewer children will be at risk of stature decrement, 29,000 fewer children will require compensatory education, 82,400 fewer children will be at increased risk of hematological effects, and 680,000 fewer fetuses will be at risk annually (US EPA 1986).

Recent research has looked at the long term physical effects of low-level lead exposure, a subject which has been neglected previously. Herbert L. Needleman (et al, 1990) conducted an eleven-year follow-up report on *The Long-Term Effects of Exposure to Low Doses of Lead in Childhood*. In this analysis, 132 of 270 young adults, who had taken part in the initial study of first and second grades conducted at Chelsea and Somerville, Massachusetts school systems in 1975 through 1978, were re-examined eleven years later to determine if they still experienced the debilitating effects of lead which had been noted in the initial study. The many

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[1]The measurement ug/l stands for micrograms per liter, in this case, of water. The notation ppb, or parts per billion, is also sometimes used.

important findings of this study are best summarized by Needleman:

> ". . .[I]mpairment in neurobehavioral function was still found to be related to the lead content of teeth shed at the ages of six and seven. The young people with dentin lead levels >20 ppm had a markedly higher risk of dropping out of high school (adjusted odds ratio, 7.4; 95 percent confidence interval, 1.4 to 40.7) and of having a reading disability (odds ratio, 5.8; 95 percent confidence interval, 1.7 to 19.7) as compared with those with dentin lead levels <10 ppm. Higher lead levels in childhood were also significantly associated with lower class standing in high school, increased absenteeism, lower vocabulary and grammatical-reasoning scores, poorer hand-eye coordination, longer reaction times, and slower finger tapping" (Needleman, et al. 1990).

In doing their benefit analysis, EPA translated benefit estimates to expected lifetime earnings for children (based on IQ differentials) if the allowable lead level in drinking water is lowered. As can be seen in Table 1, lowering the lead consumption of children, and thus avoiding decreasing IQ levels, could result in avoiding the loss of millions of dollars of future income.

Table 1:--Estimated Annual Benefits of Reduced IQ Damage by Using Changes in Expected Future Lifetime Earnings, For Sample Year 1988

	Blood Lead Level			
	15 ug/dl	30 ug/dl	50 ug/dl	Total
Number of children	230,000	11,000	100	241,000
IQ points potentially lost	1-2 per child	4 per child	5 per child	NA
Present value of decreased earnings (1985 dollars)	$1,040 per child	$2,600 per child	$3,350 per child	NA
TOTAL (1985 dollars)	$239.2 million	$28.6 million	$ 0.3 million	$268.1 million

Source: U.S. Environmental Protection Agency. 1986. Reducing Lead in Drinking Water: A Benefit Analysis: III-59.[2]

Lead is also damaging to adults. In adult males, studies have found a continuous relationship between blood lead and high blood pressure. Hypertension is also linked to higher blood lead levels in adults (US EPA 1986). High blood lead levels also have shown decreased fertility in men. Damage to females is estimated only by the number of fetuses lost, so we cannot know the direct physical effects to women. EPA has estimated that $291.9 million could be saved annually in male adult health benefits by reducing exposure to lead (see Table 2). Because these estimates only include half of the United States population (the male half), the money saved

[2] A literature survey of the impact of IQ upon earnings was prepared for EPA by ICF (1984).

annually could increase dramatically, perhaps double, if the health benefits to women were included.

Table 2:-- Adult Health Benefits (males only)

Reduced hypertension savings (males, aged 40-59)	$ 32.5 million
Savings from fewer heart attacks (white males, aged 40-59)	15.6 million
Savings from fewer strokes (white males, aged 40-59)	3.8 million
Savings from fewer deaths (white males, aged 40-59)	240.0 million
TOTAL:	$291.9 million

Source: U.S. Environmental Protection Agency. 1986. Reducing Lead in Drinking Water: a Benefit Analysis: IV-62.

Because of this physical and monetary evidence of the damaging effects of lead, various regulations have attempted to reduce lead levels in different parts of the environment. The Clean Air Act has worked to lower the amount of lead in gasoline, which is inhaled after combustion. Superfund has worked to clean up lead contaminated soil in severely impacted neighborhoods. Even though drinking water is not a primary source of lead consumption, EPA and Congress have determined that the added health risk from consuming lead in drinking water makes regulation of this source worthwhile.

The proposed Lead and Copper Rule and the Lead Contamination Control Act of 1988 were the regulatory mechanisms prompting the DEP/DWS Lead in School Drinking

Water Technical Assistance Sessions. An overview of each regulation is necessary for understanding the DEP/DWS program structure.

The Proposed Lead and Copper Rule

On August 18, 1988, EPA proposed the Lead and Copper Rule as an amendment to the Federal Safe Drinking Water Act (SDWA) (US EPA 1988). The major goal of the rule was to lower the lead level in drinking water from 50 ug/l to 10-20 ug/l (the exact level had not been decided) as measured at home kitchen taps.

This sparked major controversy in the water industry. Because the majority of lead contamination comes from water sitting for extended periods of time in home plumbing, many water suppliers thought that a MCL[3] measured at a home drinking water tap was inappropriate. Water suppliers do not have jurisdiction over the construction of home water systems or legal access to enter homes for the purpose of drawing water samples.

The proposed Lead and Copper Rule also had a corrosion control treatment technique requirement that would be

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[3] MCL stands for "Maximum Contaminant Level." Determined by EPA, this is the maximum level of a contaminant permitted in drinking water delivered to a consumer.

triggered when the water supplier exceeded No-Action Levels (NAL)[4]. The most controversial NAL required a pH of 8 which would make water less acidic and corrosive. Unfortunately, this method of making water less corrosive does not work for all water systems. Raising the pH of water in some systems will reduce the effectiveness of disinfection, potentially requiring increased chlorination. Increased chlorination, in turn, can cause greater formation of THMs (Trihalomethanes)[5], causing the drinking water system to violate other SDWA regulations. A higher pH can also adversely affect the functioning of sewage treatment systems which are dependant on a delicate chemical balance.

EPA wants to regulate lead at kitchen taps precisely because it is a corrosion by-product. Because lead contamination does not usually originate in source waters, sampling for lead as it enters the distribution system or at representative points throughout the system will not adequately indicate the effect of corrosive water on both lead pipes and goosenecks[6] within public water distribution

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[4] No-Action Levels (NALs) are MCLs which trigger the implementation of a specific treatment technology when exceeded.

[5] Trihalomethanes are chlorination byproducts which have been regulated by EPA as carcinogenic substances.

[6] Goosenecks are pipe fittings which connect building service connections to the primary water main. They resemble a goose's neck in shape.

systems or lead and brass pipes, brass fixtures, and lead solder that may be used in household plumbing.

With this proposed rule, water suppliers would be required to gain access to multiple households very early in the morning to draw water samples before any household members had used the water. The number of households sampled would vary according to the size of the public water system. Large water systems, serving more than 100,000 people, would bear the greatest burden, being required to sample 100 homes every six months. But, they would be better able to bear the costs of personnel and laboratory analysis associated with this sampling due to economies of scale. Small systems with fewer than 500 people, and potentially only 15 service connections, would be required to take 10 samples every six months (US EPA 1990a). Small systems usually have the fewest resources and would bear the financial brunt of this rule.

Water suppliers cannot require a homeowner to upgrade plumbing, even if that is the sole source of contamination in a home. However, high lead results at such a sample location would require the water supplier to go through extensive and expensive measures to prove they are utilizing the best possible corrosion control treatment.

EPA received hundreds of comments from public water suppliers, state primacy agencies, and consulting firms regarding potential problems associated primarily with the requirements of sampling frequency, difficulty in gaining access to homes, and the requirement that EPA can only mandate a treatment technique or a MCL (Maximum Contaminant Level) requirement, not both. EPA has not finalized the Lead and Copper Rule. The EPA Lead and Copper Advisory Committee released two options papers in January 1990 in which the agency had still not finalized the most fundamental issues of either the lead MCL (they are choosing between 10, 15, and 20 ug/l) or to require a specific treatment technique.

Lead contamination has increasingly become a popular media and public interest topic. For example, in Mashpee, Massachusetts, a new school was opened in the fall of 1988. Plumbing had been installed according to lead free specifications. However, initial sample results of drinking water indicated lead levels of over 100 ug/l. The major source of this contamination was found to be the corrosivity of the municipal water being supplied to the building. Lead in paint became the focus of an recently published Environmental Defense Fund study on childhood lead poisoning. The study found well over one-sixth of US children from 6 months to 5 years with elevated levels of

lead in their body, primarily from lead paint in older housing units (Dumanoski 1990).

To alleviate the concern caused by situations such as this, EPA is now acting quickly to finalize the Lead and Copper Rule by November 1990. Many difficulties still exist with the rule which could affect the effectiveness of its implementation, but EPA is attempting to resolve these matters quickly in the interest of public health.

Lead Contamination Control Act of 1988

In an effort to expeditiously protect the population most sensitive to lead contamination, Congress passed Public Law 100-572 on October 31, 1988, better known as the Lead Contamination Control Act (LCCA) of 1988. This Act requests only primary and secondary schools to test for lead in their distribution systems and requires state primacy agencies to establish programs for assisting schools ". . . in testing for, and remedying, lead contamination from coolers and from other sources of lead contamination . . ." (LCCA 1988).

A major requirement of the program mandates the EPA Administrator to publish a list of all water coolers that are not lead free (having greater than 0.2 percent lead). The Consumer Product Safety Commission is instructed to issue an order requiring the manufacturers and importers of

these coolers ". . . to repair, replace, or recall and provide a refund for such coolers within 1 year after the enactment of the Lead Contamination Control Act of 1988" (LCCA 1988). Uncooled water fountains can also contribute lead to water, often from internal brass piping. These fixtures are not covered in this rule.

EPA has compiled a list of water coolers which are not lead free, and also a 1990 update, according to the Congressional instructions. The recall of coolers has not yet occurred. Halsey Taylor, the major producer of water coolers, has acted on its own to offer a 60% discount towards the purchase of a new water cooler plus shipment costs for all water coolers found to violate the LCCA and returned to them. But even this generosity does not compensate for a total recall.

It is because of the requirements of the LCCA that the DEP, Division of Water Supply developed a program to work with Non-Transient Non-Community (NTNC) Schools. The program would eventually need to be expanded, with the help of the Massachusetts Department of Public Health, to the hundreds of schools on municipal water systems, but it was the desire of DEP/DWS to first conduct a pilot program with the group of schools the Division was already regulating.

Non-Transient Non-Community Water Systems

Non-Transient Non-Community (NTNC) water systems are defined in the State and Federal Safe Drinking Water Act (SDWA). The SDWA standards are deemed necessary by the Environmental Protection Agency and the Massachusetts Department of Environmental Protection to provide safe drinking water for people to drink.

The definition of a NTNC water system needs to be explained in more detail before the complexities of the DEP/DWS project can be properly understood. The different categories of water suppliers are very complex. EPA explains them best:

> "A public water supply is defined as a water system which provides piped water for human consumption and has at least 15 connections or regularly serves at least 25 persons 60 days out of the year. Public water supplies are separated into community and non-community water supplies. Community supplies are typically residential water systems which regularly serve 25 or more people year-round or have 15 or more service connections. Non-community water supplies are non-residential water supplies comprised of transient and non-transient water systems. Transient water systems are supplies such as campgrounds, small restaurants, and service stations" (US EPA 1989c).

A Non-transient Non-community water system (NTNC) is defined as a facility which has its own source of water and is not a community water system and also regularly serves at least 25 of the same persons, or 15 service connections,

over six months per year. "Regularly" has been defined by EPA to mean four hours or more per day, for four or more days per week, for 26 or more weeks per year (Baltay 1987). Paul M. Baltay, Director of EPA State Programs Division in 1987, expressed concern over this definition, fearing that this explicit definition of the word "regular" would encourage water systems to ". . . become mired in numerical games and lose sight of the fundamental intent of protecting health" (Baltay 1987).

NTNCs usually include facilities such as schools, daycare centers, nursing homes, factories, and offices that have their own wells. Other service areas such as hotels, resorts, hospitals and restaurants are included if they employ more than 25 people. NTNCs generally lack the training and finances to run a public water system. Most do not have a certified operator to oversee their water system, which is required by the Safe Drinking Water Act. Instead, they have business managers, plant managers, superintendents, principals, pastors, etc. taking care of their drinking water system. The majority of these people have no training as water suppliers and have never thought that they would be required to comply with the Safe Drinking Water Act. Some of the NTNC school water suppliers do not understand the DEP/DWS regulations with which they are required to comply.

Employees, or users, of these NTNC facilities can often spend at least a third of their waking hours and consume approximately 1/2 to 1/3 of their daily water at these facilities (EPA 1989c). Because these facilities are like a "second home," EPA deemed that the population served by these facilities was at a higher risk to water contamination than people served sporadically by other Non-Community systems and should be more strictly regulated (Riley 1990). EPA regulated Non-Transient Non-Community water suppliers in 1986. States were required to identify NTNCs from their working inventory of Non-Community systems by October 1, 1988 so that they could begin FY 1989 with a "reasonably sound" NTNC inventory (Baltay 1987).

Massachusetts was one of the first states to complete its inventory in June 1988, through a survey sent to addresses of potential NTNCs. Included in this mailing was a lead public notification poster which was to be posted by a primary drinking water source for 3 months beginning June 19, 1988. Schools were to post this notice for 6 months beginning on the same date (Deese 1988). This was NTNC schools first opportunity to think about possible lead contamination of their drinking water supply.

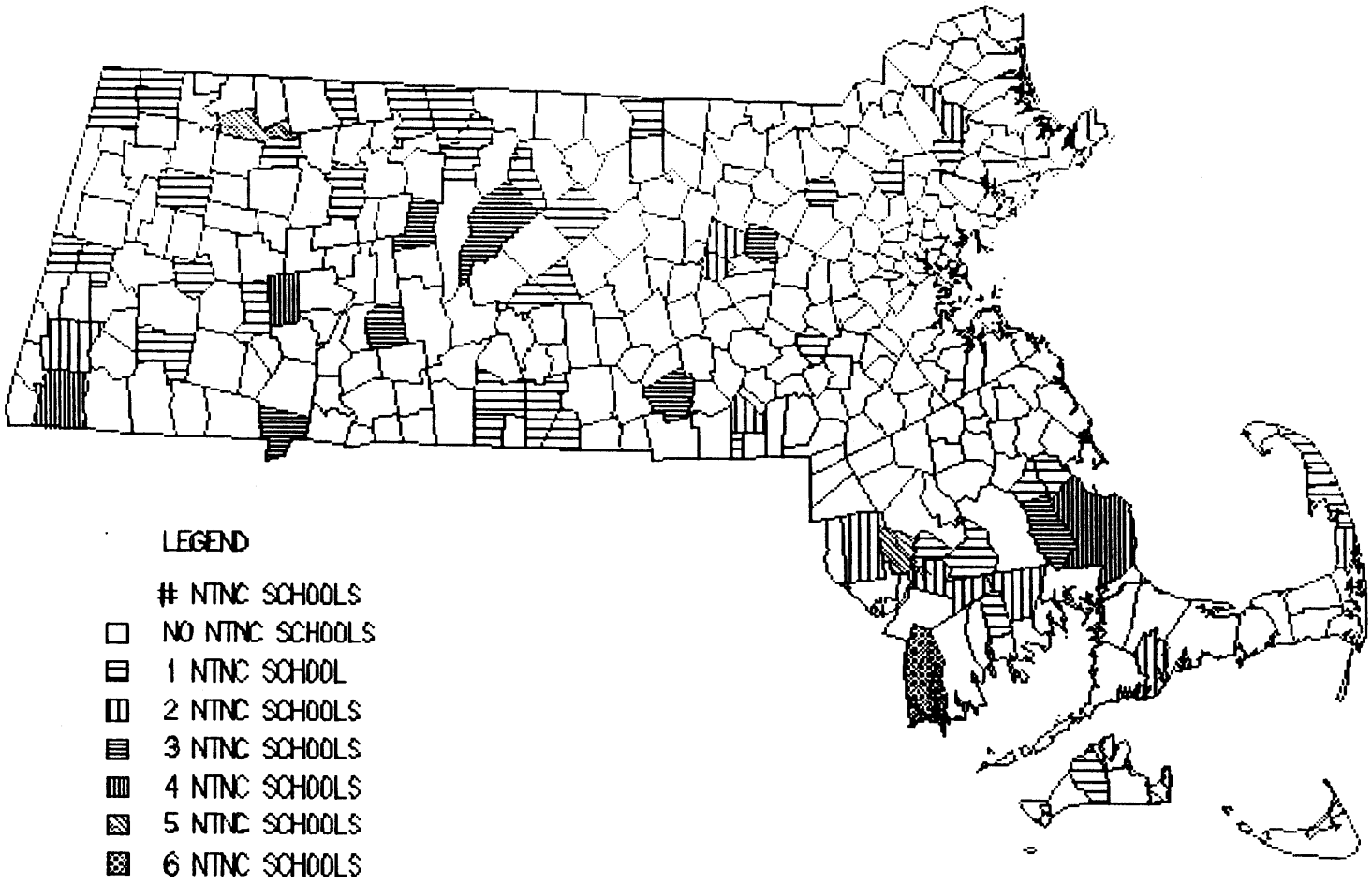
Eventually, NTNCs will be expected to conduct all sampling currently conducted by community systems. Many regulations will become effective within the next several years and will also require NTNC compliance. Compliance will become increasingly expensive. Testing will cost several thousand dollars every year (Crockett 1990). This does not include the cost of installing treatment (should contamination be found), maintenance costs, or the hire of a certified operator.

NTNC Schools

The NTNC schools that were the focus of the DEP/DWS Lead in School Drinking Water Program are a prime example of the problems experienced by NTNCs as a whole. They often have budget problems due to their town's financial situation, are staffed by people who are not trained water suppliers, and serve water to children who are the most susceptible population to water contamination because of their size and body metabolism.

Though only schools which have their own well are considered NTNC water suppliers, several NTNC schools may be located in one town, making it necessary for the town to finance multiple testing. As can be seen in Figure 1, this "many to one" situation may require a school district to finance as many as 6 different school water systems. Just

Figure 1: NTNC SCHOOLS BY TOWN



because two or more schools may be located in the same town does not always mean that they are financed by the same budget, but if they are part of the same school district, they often are. The strain of financing a water system is additionally strained because of the recent 1990 cutback in Massachusetts state funding to towns. This situation will only become worse as NTNC schools are required to meet more Safe Drinking Water Act Regulations.

As with other NTNC water suppliers, a wide variety of people take care of NTNC school water testing requirements and sign off on official papers. This makes it extremely difficult for state employees to determine with whom to work. Official mailings are sent to the person legally responsible for the school. However, as can be seen in Table 3, the person filling out forms or caring for the water system is not always the person responsible for the water system. The persons filling out paperwork range from superintendents to facility superintendents to business managers to Board of Health Agents. This poses a problem with training. DEP/DWS should train both the person responsible for the water system and the person managing the water system. However, usually only one of these persons attends training sessions.

Table 3:-- Persons Signing Sanitary Survey Forms for NTNC Schools (by job type):

Administrator	3
Administrative Assistant	3
Assistant Superintendent	4
Board of Health	4
Board of Selectmen, Chairman	1
Business Manager	7
Director	4
Facility Superintendent	33
Minister	3
Principal	14
Superintendent	9
Information Not Available*	29

* Because the most recent Sanitary Survey Report which these schools submitted was 1988, which did not ask for the title of the person filling out the form, some information is unavailable.

The size of Non-Transient Non-Community (NTNC) schools may vary drastically. A NTNC is categorized by the amount of time a non-resident population is consistently served at a facility, not by size. As can be seen in Figure 2, the size of NTNC schools in Massachusetts ranges from 25 to 1,500 students and employees. A NTNC school could have 5,000 or more students and employees and still be classified as a Non-Transient Non-Community system if there are no permanent residents. This variety can be a serious problem when trying to design a testing or training program which will fit the needs of both large and small NTNC schools.

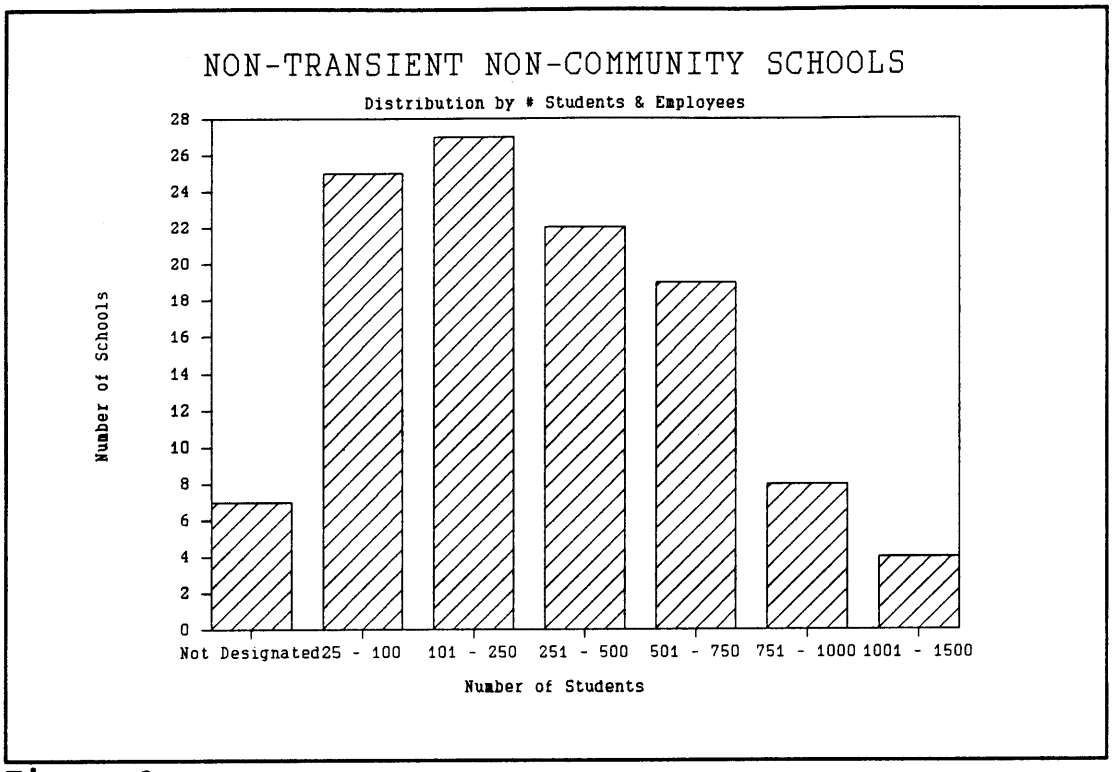


Figure 2

The focus of the next several chapters is on how to work with NTNC schools which have no set size or organizational structure to gain compliance with DEP/DWS testing and training programs. Chapter III looks at methods used by both a non-profit organization and a governmental organization to work with disaggregate groups similar to NTNC water suppliers. Chapter IV looks in detail at the DEP/DWS program to work with NTNC schools.

CHAPTER III

RELATED IMPLEMENTATION EFFORTS

It is instructive to look at other efforts to work with entities similar to Non-Transient Non-Community water systems in type and size. In this chapter, I will first give a brief overview of the trends in working with very small community water suppliers. I will then look more specifically at two programs: one conducted by a non-profit corporation to help small community water suppliers comply with Safe Drinking Water Act regulations, and another conducted by a government agency to gain compliance from Very Small Generators of hazardous waste.

The Concept of Cooperative Guidance

The difficulty of gaining compliance from small community water systems has been recognized since the mid 1970s. It has only been recently that concerns about non-compliance have been extended to Non-Transient Non-Community systems. In 1977, EPA produced a small systems report in conjunction with the National Rural Water Association (NRWA), to

provide guidance to small systems for planning, designing, developing, operating and maintaining their water system (US EPA 1979).

Various other groups have worked together with the same goal, to provide guidance for small community water systems. The American Water Works Association (AWWA) and NRWA have funded a certification test for the operators of very small systems. AWWA also produces a newsletter called *Outreach* which is specifically designed to address the problems of small water systems. Even with these various combined efforts, no systematic network or system for working with small water systems has been developed. As a result, new outreach efforts sometimes repeat work which has been done before.

An important example of duplicated outreach for the DEP/DWS Lead in School Drinking Water program is a joint mailing sent from the Massachusetts Department of Public Health, Department of Education, and Department of Environmental Protection (then called the Department of Environmental Quality Engineering) to reach the superintendents of all public schools; private and parochial school principals; collaborative directors; and boards of health, for the purpose of explaining the hazards of lead consumption and methods for short-term mediation of

potential problems and full plumbing evaluations and testing (DEP 1988).

The group mailing did not result in group follow-up. No data from lead testing was collected by DEP/DWS. A questionnaire was sent out by DEP, Division of Water supply independently to all certified laboratory operators, plumbing inspectors, and public water suppliers to determine how many schools had contacted these entities for help with lead testing after the 1988 mailing. Because of a lack of coordination between agencies, I only became aware of this mailing after the new program was completed. The current Lead in NTNC School Drinking Water Program was developed independently. It was only discovered during the technical assistance sessions that the Department of Public Health had a related school lead testing database.

These efforts to gain compliance from NTNC water suppliers, often duplicated through such lack of communication, has prompted a large number of manuals and papers on how to run small water systems and also make them economically viable.[7] Few, however, have suggested how

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[7] These options can be seen in various papers including Miller (et al). 1988. The Role of the States in Solving the Small System Dilemma, AWWA, Vol. 80, No. 8, and US Environmental Protection Agency. 1989. Ensuring the Viability of New Small Drinking Water Systems; A Study of State Programs, EPA-570/9-89-0004.

concerned government officials should actually work with small community and NTNC water suppliers to gain compliance with the impending onslaught of regulations.

Trax (1989), of the National Rural Water Association, suggests that the only way for government to get the attention of small water system owners is to work with them on a first hand basis. An endless flow of paper telling systems how to operate, or threatening them because they haven't done something correctly, will only succeed in making system owners antagonistic towards the regulating agency. No one benefits from this strategy. The following two examples of compliance programs illustrate several alternative methods to work with small diversified groups.

The Rural Water Resources Program

One non-profit corporation, the Rural Housing Initiative, Inc. (RHI), a non-profit, tax exempt company funded primarily by Federal grants, that provides state agencies with grass roots assistance in small communities, has utilized this concept of working directly with small community water suppliers. The Rural Water Resources (RWR) Program, run by RHI, has been providing training and consultation to small community water suppliers in the rural Northeastern United States for the past 10 years.

The program's purpose is to assist rural, low income communities with their water and sewer problems, primarily through helping communities find construction grant money and planning how to approach a given problem. RWR personnel do not design or engineer facilities. Water systems personnel are worked with individually and through group training sessions. I interviewed Ted Cady (1990), who runs the Massachusetts RWR program and works with DEP/DWS to provide assistance to small community water supply systems, to see how his staff implements training programs.

Cady has found that most small community water workers are part-time and volunteer. Because the water worker's regular job often does not include maintaining the water system, attendance at training activities for water suppliers necessitates taking time off without pay from the full-time job. As a result, this group of water suppliers, most in need of help and training, often does not attend state sponsored daytime training sessions.

As a result, Cady spends a lot of time providing this training and information. If the community doesn't understand enforcement orders (notifications of a water supply's violation of a standard), Cady explains what the order means and requires. He also helps organize

communities so that they can deal with a problem; he gives them guidance on how to go about solving a problem. He also identifies funding and application methods for community projects. The RWR Program personnel do not serve as engineering consultants: they don't design treatment plants or recommend pipe specifications. They act as planners, teaching methods to achieve goals. RWR personnel rarely work with Non-Transient Non-Community water systems because there is currently no grant money for RWR training sessions or for construction in most of these systems. Some NTNC systems, such as schools, may have grant monies available, however this has not yet been explored.

Cady has found that several conditions are important to achieving high attendance rates from small water suppliers who are not paid to attend training sessions. As previously mentioned, sessions should be held in the evening or early morning so the operators do not miss their regular jobs. Cady has found that meetings held at 7 am or after 4 pm, before the summer months, have high attendance rates. These meeting times allow businesspeople to attend before or after the work day, with time left in the evening.

Schools representatives have even more limitations on their attendance time. They generally cannot get away during the day. Cady suggested that attaching training to a

conference which representatives would normally attend or getting water supply training to count for continuing education credits (with which pay raises are sometimes associated) would encourage school representatives to attend meetings. Cady also said that it just might be impossible to gain the attendance of some people.

A key component of Cady's strategy for successful meetings is his use of other organizations. He utilizes the resources of these organizations to help him contact and encourage attendance from the group he is targeting for training. For example, the Extension Service has found that people don't like to drive more than twenty miles to attend training sessions. This information initiated a multiple training session approach.

The Safe Drinking Water Act Workshops which the Rural Water Resources Program (RWRP) organized are an example of how to utilize the concepts outlined above. Cady started several months in advance to organize co-sponsors for the event. Some of the co-sponsors included DEP/DWS, local Boards of Health, Conservation Commissions, Chambers of Commerce, the Extension Service, etc.

Each co-sponsor performed a different function (e.g., copying materials and providing mailing labels, arranging

meeting locations, providing refreshments). All co-sponsors endorsed the event and carried announcements in their newsletters. Some groups sponsored radio announcements.

The benefit of this co-sponsor system is that a variety of small water suppliers are contacted. Co-sponsorship of the event by an organization closely affiliated with the water supplier, or one which he/she respects, lends credibility to the training session. Co-sponsors like the system because they can get a large amount of credit for very little input. RHI held multiple sessions in each DEP/DWS region of the state.

This approach resulted in attendance rates of over 20 at every session. Five sessions were held in the DEP Western Region alone. The sessions were not promoted as a DEP/DWS event, even though the purpose was to train people to meet DEP/DWS Safe Drinking Water Act Regulations. DEP/DWS is often looked on as the "bad guy," which small water suppliers try to avoid if possible. Sometimes this avoidance can work against their own interests. The lack of DEP/DWS affiliation could have increased attendance.

Cady stressed several times that the key to high attendance is learning how to reach an audience. A successful training program will often require more time for

working out an implementation strategy than for compiling the materials to be used in the sessions.

An approach similar to what Cady recommends has already been implemented at the state level by the Massachusetts Department of Environmental Protection, Division of Hazardous Waste's program for Very Small Quantity Hazardous Waste Generators. A look at this program shows how Cady's general recommendations can be utilized at the state level.

Very Small Quantity Hazardous Waste Generators

The Massachusetts Department of Environmental Protection, Division of Hazardous Waste (DHW), regulates the treatment and disposal of hazardous waste. The smallest category of generators which DHW regulates consists of the Very Small Quantity Generators (VSQ generators) which produce under 25 gallons of hazardous waste per month.

As with NTNC water suppliers, VSQ generators include many essential services, such as printers, drycleaners, dentists, painters and institutions such as schools and hospitals. These generators number in the thousands. DHW has already registered over 7,000 VSQ generators and they receive nearly 500 new registrations monthly.

These new registrations are not acquired by aggressive recruitment. VSQ generators most often learn through trade unions, newsletters, or their licensed transporter that they must register with DEP/DHW.

Nancy Wren (1990), who is the outreach coordinator for VSQ generators, in interview, said that there is a lot of handholding required in her job. For instance, a representative for the Massachusetts Dental Society printed the requirements for the treatment and disposal for Small Hazardous Waste Generators in the society's newsletter. These requirements were significantly more involved than those for Very Small Quantity Generators. The result was a flurry of panicked calls to DEP from the 5,000 dentists in Massachusetts. Wren was required to undo the misinformation and notify the Massachusetts dentists of their real obligations.

Even though there are many more VSQ generators than there are Non-Transient Non-Community (NTNC) water suppliers, there is not a proportionately greater amount of paperwork involved with regulating them. VSQ generators must fill out one 5 1/2" x 8 1/2" single-sided form that contains information about the company and the types of waste generated per month and the disposal, storage, treatment, and/or recycling of each waste type. On the back of the

form is a short list of rules which the generator must follow.

This paperwork differs vastly from the DEP Division of Water Supply's normal routine. Because VSQ generators don't have new rules regularly imposed on them and don't have a heavy flow of informational mailings, notices of non-compliance, yearly detailed registration forms, and testing results which they must submit either monthly or quarterly, registration and compliance are relatively simple. VSQ generators, which are usually profit organizations as opposed to NTNCs which are usually non-profit, can more easily include compliance costs in their operating expenses. Also, because the public perceives a bigger public health threat from the mishandling of hazardous waste than from contaminated drinking water, there is more social pressure on these VSQ generators to comply. In turn, the VSQ generators feel they are making a major contribution to helping the state at almost no expense or effort on their part.

As the only person working with the VSQ generators, Nancy Wren can do very little of the outreach work personally. Similar to DEP/DWS efforts, she compiles Fact Sheets targeted at specific waste generating groups. There is also a Compliance Assistance Line, comparable to the Safe

Drinking Water Act Hotline, which VSQ generators can call for help or answers to questions. The most important aspect of the VSQ generator program to be applied to the DEP Division of Water Supply NTNC program is the outreach to professional organizations. She contacts trade unions. Licensed transporters of the hazardous waste also work with her to inform the VSQ generators that they must register.

Conclusions

The outreach programs outlined in this chapter all worked with and utilized other organizations such as unions and local boards of health to gain common goals. Without this group effort, it is very likely that the programs would have been much more limited in their outreach. The next chapter will now look in detail at the Lead in NTNC School Drinking Water technical assistance program of the DEP Division of Water Supply. The experiences of the Rural Water Resources Program and the Very Small Quantity Hazardous Waste Generators Program will provide additional basis for analysis and further recommendations in Chapter V.

CHAPTER IV

THE NTNC LEAD IN SCHOOL DRINKING WATER PROJECT

The steps taken to develop the technical assistance strategy to help NTNC (Non-Transient Non-Community) schools test for lead are discussed in this chapter. The assumptions, procedures, and materials used throughout the process are described. Then I discuss the problems I found during the process.

This was the first attempt to gain compliance from NTNC water suppliers for contaminant testing beyond their routine bacteria, sodium, and nitrate testing. This was a Department of Environmental Protection, Division of Water Supply (DEP/DWS) project which I primarily planned and managed. It received input from many DEP/DWS employees. I will add my personal insights to the project where appropriate, elsewhere, I will refer to the project wholly as a DEP/DWS product. In this chapter, I will first provide an overview of the project, a review of the problems which arose, and then a discussion of the project results.

Project Overview

The NTNC technical assistance program was developed to fulfill two purposes: 1) to meet the requirements of the Lead Contamination Control Act (LCCA), and 2) to give NTNC schools a head start in complying with the potentially expensive Lead and Copper Rule. The LCCA included restraints which would not allow DEP/DWS to require schools to test for lead and did not require the use of the new lead MCL (maximum contaminant level) standards to be adopted in the Lead and Copper Act. We wished to use the Lead and Copper Act requirements, but since they were not yet finalized, the DEP/DWS approach for this project was to strongly request NTNC schools to test their plumbing systems for lead contamination and to help them plan remediation procedures. Depending on the type of contamination found, the implementation time for correction procedures could be short or long term.

Because NTNC schools are relatively inexperienced as water suppliers, the procedure for testing, interpreting results, and remediating any problems must be as simple as possible. DEP/DWS has also determined that it is necessary to provide guidance to school personnel in interpreting test results or planning remediation. This is not routinely done with larger public water systems. Lead testing requires multiple samples drawn at each drinking water location

throughout the building(s). The test results from this process can be utilized to pinpoint the source of lead contamination, but the multiple test results that allow this determination can be confusing.

Personalized technical assistance sessions are the focal point of the program. Individualized sessions have never been formally organized at DEP/DWS before, largely because of the time and personnel necessary to conduct them. However, we felt that 112 schools were a manageable group for which to hold sessions. The anticipated turnout was approximately 50%. DEP/DWS personnel felt that the extra time spent working with these schools could encourage them to seek help from DEP/DWS in the future, if they had problems or questions. This could avoid noncompliance with testing procedures and unnecessary or inappropriate modifications to systems. The following sections will explain in greater detail the underlying factors which influenced the final form of the technical assistance program.

Assumptions

The design of the project was based on three assumptions. First, I assumed that no previous lead testing had been conducted by NTNC schools. I found no evidence of any testing for lead conducted as a result of the 1988 mailing

sent in conjunction with the Departments of Public Health and Education. This mailing encouraged testing only after a plumbing profile was completed which indicated a likelihood of lead contamination. As a result, I structured this program as a wholly separate effort, which did not build on the previous program.

The second assumption was that communications and directives must be simple and non-technical. The experience level of NTNC water suppliers is usually very low. In my mailing, the explanation of lead health effects was simplified, as was the testing protocol. The individualized technical assistance sessions were designed to simplify the interpretation of complex test results for school representatives and to help them plan for system changes, if necessary.

The third assumption was that NTNC schools are small. Based on Boston DEP/DWS staff experience, I estimated that the average school would be small, having only 4 or 5 testing locations, with approximately 150 students. Estimating $20 per sample, with 3 samples drawn where the water enters the building and 2 samples drawn at all other drinking water sites, this would cost approximately $220. This low cost estimate made DEP/DWS comfortable in requesting schools to test at all drinking water sites.

The Project Approach

The Notification Letter

Based on these assumptions, I wrote a carefully-worded and simplified letter that did not refer to the 1988 mailing or ask for any test results from previous lead sampling to be sent to DEP/DWS. The letter (see Appendix A) basically stated the goal of the program to be the lowering of consumed lead and copper levels. The basic hazards of lead consumption for children were explained. The steps requested of the NTNC schools were listed as follows:

1. Evaluation of their distribution system
2. Removal of all EPA listed lead-lined water coolers[8]
3. Collection and analysis of water samples
4. Interpretation of the results by DEP personnel at individualized technical assistance sessions
5. Remediation

The letter also stated the requirements of both the Lead Contamination Control Act (LCCA), which mandated DEP/DWS provide guidance, and the proposed Lead and Copper Rule which would soon require a lower lead level than currently used. The requirement for notifying all persons connected with the school (parents, teachers, and other personnel) was explained. The letter and attachments included: 1) a system

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[8]As part of the Lead Contamination Control Act, EPA was required to compile a list of water coolers which contributed lead to the water. EPA is required to update this list as new information becomes available.

evaluation form and testing instructions, 2) a list of Massachusetts certified testing labs (for metals), and 3) a sample testing results notification letter (see Appendix A). Schools were given two months in which to complete testing before the technical assistance sessions were held during the week of January 16 - 19. The following sections will describe specific parts of the letter and attachments in greater detail.

Because the LCCA does not require schools to test, and because the Lead and Copper Act was not yet finalized, the approach taken in the letter was twofold. First, the language was as strong as possible without actually saying that schools were 'required' to test for lead. Specifically, the language read that DEP had

> "...determined that you [school superintendent of a NTNC school] will be responsible for complying with proposed regulations by the Federal Environmental Protection Agency (EPA) for lead and copper... In addition, the EPA Lead Contamination Control Act (LCCA) requires that possible lead problems in schools' drinking water be identified and resolved."

In addition, the letter emphasized the susceptibility of children to lead consumption, listing the major kinds of damage which can be done at even low levels of lead consumption. Because DEP/DWS could not require schools to test for lead, we wanted to encourage the often automatic reaction of adults to protect children from physical harm.

The Technical Assistance Sessions

Schools were instructed to call their DEP/DWS Regional representative to schedule a half hour consultation session for a the day specified in each region during the week of January 16 - 19. Representatives were to bring school plumbing blueprints and lead test results to the session. The time would be spent locating the contamination source (if any), recommending correction procedures, discussing a schedule for corrections, and answering any other questions the school representative might have.

Because of the multiple samples drawn at each sample location, determining a contamination source is not always easy to do. For example, Boston Public Schools conducted testing of their schools and found results which indicated lead contamination coming from a combination of sources, including: the building plumbing, old porcelain wall-mounted drinking fountains which have internal brass piping, and in some cases, the municipal drinking water. Because Boston Public Schools wanted to preserve the water fountains, they chose to run a dedicated water line from the water's entry point to the school to the drinking fountains (Roy 1989). This action resulted in much expense, but it did not alleviate the lead contamination problem because only some specific sources of contamination were removed. Boston

Public Schools utilized a uni-dimensional solution for a multi-dimensional problem. DEP/DWS did not want to see this happen elsewhere.

The Testing Protocol

A simplified, two page testing guide was included with the letter (see Appendix A). This was condensed from the original 40 page EPA *Lead in School Drinking Water* testing guidelines which required sampling of water and sediments at all drinking water fixtures and interior plumbing. This protocol is complex and expensive. DEP/DWS requested schools to test only at all drinking water fountains (both cooled and uncooled), the kitchen faucet, and the water entry point to the building to determine if a contamination problem existed.[9]

The assumption behind the DEP/DWS simplified procedure was that the majority of lead contamination would be found

[9]The sampling procedure requires two samples drawn from each drinking water faucet or water fountain. The first sample captures the first water out of the tap. For the second sample, the water is allowed to run until the temperature changes, approximately two minutes for bubblers and fifteen minutes for water coolers, before the sample is drawn. The difference between these two results will determine whether the source of contamination is the water fountain or the pipes. A similar procedure is followed for the tap nearest the water's entry point to the building, except that three samples are drawn, the third after the water temperature changes a second time. This pinpoints the contamination source at either the tap, the water service connection, or the well.

in water coolers and bubblers, which could easily be removed to eliminate the contamination source. Plumbing blueprints would be utilized to identify areas for more detailed testing, if the water fountains were not the source. Conducting this more generalized testing to initially identify problem areas within a building, rather than detailed testing everywhere as specified by the EPA manual, could save the water supplier money through eliminating potentially unnecessary testing.

A pre-testing evaluation form was included to determine how likely a building was to have lead contamination. Some obvious indicators of lead contamination are lead pipes or lead service connections. Brass also contains lead, making brass piping and brass water fixtures, such as faucets, another likely source of contamination. If people are not familiar with the piping materials of their building, then a simple benchmark to use is the building's age. Buildings built before 1940 are more likely to have lead or brass pipes.

Lead solder can be a major source of contamination in buildings currently less than five years old, but built before 1986. Before a ban on lead plumbing materials was enacted in the Safe Drinking Water Act Amendments (1986), the solder commonly used by plumbers was 50-50 tin to

lead.[10] This allowed the solder to melt more easily when it was being used to join pipes. This high concentration of lead can be leached by corrosive water into the building's drinking water. After approximately five years, the majority of lead has been leached out of the solder. Buildings constructed between 1983 and 1986 are currently considered to be the highest risk group for this source of contamination.

Buildings which are unused for periods over 6 hours have a higher likelihood of lead contamination in their water. As water sits in pipes, the lead will continuously leach into the water, raising the concentration levels higher and higher. Flushing water pipes is sometimes recommended as a short term remediation for smaller buildings where the water sits stagnant for long periods of time. However, in a large building with complex plumbing, this is both an impractical and wasteful solution for eliminating lead contamination.

Other Attachments

The EPA compiled list of water coolers that are not lead free was included with the letter (see Appendix A). This

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[10] The use of lead solder on water plumbing in Massachusetts was banned in 1986, two years before the EPA deadline. Because of this relatively early ban, no housing units will have 'high risk' plumbing of less than five years old after 1991.

list gives the model numbers of coolers from Halsey Taylor Company, EBCO, and Sunroc Corporation that are not lead free.

A list of laboratories certified by DEP for analysis of trace metals (including lead) was also sent to all schools (see Appendix A). Only these laboratories have met the standards set by the State laboratory for testing trace metals. Analysis done by other, uncertified laboratories, is not accepted by DEP/DWS.

Also enclosed was a sample letter for the notification of lead results, which could be used by the schools for parents and staff (see Appendix A). This letter was carefully worded, and was meant for use after testing had been conducted and either acceptable results were found or the problem had been resolved. The inclusion of this sample letter was important because of the delicacy of the topic of lead contamination and the inexperience of NTNC schools with communicating this type of information.

Post-Mailing Problems

Even with this careful preparation, four major problems arose not long after the letter had been mailed. The first problem was one that no one had foreseen. Some schools had

already tested for lead contamination, but had not sent their test results to DEP/DWS. Some school representatives called or sent a letter to inform DEP/DWS that they had already tested. Some had sent their results to their local boards of health or the Massachusetts Department of Public Health. Some still neglected to send DEP/DWS a copy of their test results, even when requested to do so over the phone. It was a major oversight not to include specific instructions requiring schools to send in either current or previous test results.

A second major problem was that some schools felt huge financial constraints. The assumption that most schools would be small and have few water fountains to test proved incorrect. Chapter II listed the statistics on school size, but this analysis wasn't completed until after the letter was sent. Schools ranged in size from 25 to 1,300 students and staff members. Some elementary schools had a sink and water fountain in every classroom. Other schools belonged to the same school district, multiplying the expenditure needed from one budget. Testing for these schools would cost thousands of dollars if all drinking fountains were sampled. Schools in this situation were advised to attend the technical assistance sessions so that DEP/DWS staff could help determine representative sampling sites.

Third, the politics of school budgets was a limiting factor. Many schools already had set their budgets for the year, making it difficult and time consuming for them to request the necessary funds for lead testing. DEP/DWS had specified a submittal date allowing two months for the NTNC schools to arrange for testing, test, and submit results. This short time allowance would necessitate immediate attention from school personnel for the project. Twenty five schools were not able to conduct testing until after the specified date. The range of extension time needed for testing completion ranged from one-two months to the next school fiscal year.

Finally, some schools questioned whether or not DEP/DWS could "make" them test, and what would be done if they did not. We responded that at this time DEP/DWS could not force any school to test for lead. However, when the Lead and Copper Rule became final in November 1990, DEP/DWS could enforce its current request. We did suggest that schools should conduct lead testing before parents found out that the school had not taken advantage of DEP/DWS's technical assistance program. We also stated that DEP/DWS was trying to help schools by giving them a longer time to plan their compliance with the proposed Lead and Copper Rule which would become finalized in November of 1990.

Phonecall Follow-up

Phone calls made by DEP/DWS personnel to NTNC schools one week before the technical assistance sessions provided the formal source for determining the extent of the afore mentioned problems. The week preceding the sessions, no schools had signed up in either the Central or Northeast regions, one had signed up in the Western region, and four had signed up in the Southeast. We contacted and talked with representatives of over fifty percent of the NTNC schools and left messages at another twenty-five percent of the schools. We were unable to contact the remaining twenty-five percent because of incorrect or lack of phone numbers in our data base. There was insufficient time to correct this problem.

Table 4 indicates the frequency and type of responses received from the schools, the most important of which have already been discussed. Full documentation of each school and their response in included in Appendix B. Messages which were left with schools, but unreturned, are not tabulated in this table. There were also approximately 10 - 12 schools which called the regional offices with questions during the first two weeks after the letter was sent out. These calls are not documented in Table 4 because many of their responses were repeated in the phone call follow-up.

TABLE 4.-- Primary Response to Phonecalls

	Western	Central	Northeast	Southeast
Too Expensive	4	1	2	
Already Tested*	7	5		7
Not Mandated		3		1
Forgot		1		
Will Test Soon	2	4		
Will Attend	1			4
Didn't Know if They Had Tested	4			
Bottled Water Only				2
Didn't Receive Letter				1
TOTAL	18	14	2	15

* This includes testing conducted as a result of both the 1988 mailing, the 1989 mailing, or initiated by the school independently.

Most schools realized that DEP/DWS was not trying to make unreasonable demands on them and would not force them to a compliance schedule which was unrealistic for their situation. We requested the twenty-five schools experiencing financial constraints to submit a timetable detailing when they would request funds, when they might receive those funds, and then predict a date for testing. In only four cases were DEP/DWS personnel told that testing would be conducted only after the Lead and Copper Rule became enforceable. Most school representatives were very knowledgeable and concerned about lead poisoning.

The phone call responses, which were recorded on a standardized form (see Appendix C), also gave a good indication of some other problems in the response to the DEP/DWS letter. The letter had utilized the salutation of "Dear Superintendent" without referring to schools by name. Many of the Superintendents were confused as to which school within their school district we were requesting they test, even though the letter specifically referred to and defined NTNC water systems.

Some school districts received multiple copies of the DEP/DWS letter. The DEP/DWS Non-Transient Non-Community database is constructed by listing each school individually, without listing school district affiliation. Each individual school supplied by its own well is considered an individual water supplier, even if schools are within the same school district. This was confusing for some superintendents.

Another major source of confusion was why DEP/DWS was requesting only the NTNC schools to test for lead and not all schools. DEP/DWS representatives responded that we would be working with all schools in the future in conjunction with the Department of Public Health. To find out how to best work with the schools and to help them with

their testing, we wanted to first start with a smaller group. Because DEP/DWS was more familiar with working with water suppliers, and also has legally responsible for this group of schools, we had chosen to start helping NTNC schools first.

The most fascinating discovery, found both through the phone interviews and through interaction at technical assistance sessions, was that the superintendents were not the persons handling the water supply matters in all NTNC schools. I talked to superintendents, assistant superintendents, business managers, and head custodians. I found a wide range of expertise. Some knew the exact specifications of building plumbing and the number and type of water fountains. These people were usually, but not limited to, the head custodians. One representative who attended a technical assistance session was also a part time plumbing inspector. I talked with other school representatives who had absolutely no idea of how to comply with DEP/DWS testing requests. Two representatives attended meetings with their entire file of DEP mailings and stated that they had no idea at all what to do with them. We had to explain each one.

Technical Assistance Sessions Response

The phonecalls resulted in twenty three technical assistance appointments; 9 in the Western Region, 4 in Central Region, 2 in the Northeast region, and 8 in the Southeast Region. The majority of these, 16 of the 23, were representatives attending to gain help in determining representative drinking fountains for testing. In some cases, multiple NTNC schools were represented by one person from a school district. In total, four representatives attended with new test results, and 3 attended with old test results. Twenty schools sent in copies of their test results only. Tables 5 and 6 show the distribution of results from each region.

Table 5 shows the technical assistance attendance, by Region. Twenty-two percent of all NTNC schools attended the technical assistance sessions. The Western and Southeast Regional offices had the highest number of technical assistance attendees, with nine schools attending in each region. In the Western Region, eight of the nine came for help with deciding how to conduct testing. In the Southeast Region, five schools attended with both old and new test results in hand, and four schools attended for help with deciding how to test. The Northeast Regional office had the highest percentage of NTNC schools in its region attending the technical assistance sessions. However, since this

region accounts for the fewest schools (6) in the whole state, it is not a very meaningful statistic.

TABLE 5.-- Technical Assistance Attendance, By Region

Region	# NTNC Schools	# Attending w/ old Results	# Attending w/new Results	# Attending for Help	Total	% of Region
Western	43	0	1	8	9	.21
Central	27	1	1	2	4	.15
Northeast	6	0	0	2	2	.33
Southeast	34	4	1	4	9	.26
Total	110	5	3	16	24	.22

Table 6 shows the number of mailed in results by Region. Twenty NTNC schools, or eighteen percent of all schools, submitted old and new lead testing results to DEP/DWS without attending the technical assistance sessions. The majority of these (ten) came from the Southeast Region Office, representing a 30% response rate from that region. The Southeast Region also had a 26% response (9 schools) at the technical assistance sessions. Attendance in the other Regions was considerably less.

TABLE 6.-- Mailed In Results, By Region

Region	# NTNC Schools	# Results Sent Old	New	Total	% of Region
Western	43	3	1	4	.09
Central	27	1	4	5	.19
Northeast	6	0	1	1	.17
Southeast	34	3	7	10	.30
Total	110	7	13	20	.18

Totally, DEP/DWS received responses from 50 schools, 45% of all NTNC schools in Massachusetts. In addition to the responses shown in these tables, six schools sent in letters, either stating that their system had been tested and met State and Federal lead requirement levels, or stating that they would test their school by a specified date in the future. As of this date, DEP/DWS is still receiving test results and notification from schools indicating that they are about to begin testing.

Program Results

I interviewed three experienced, upper-level employees in the Division of Water Supply to find out what percentage of response would be considered good for a first time pilot program, the target population of which is not yet familiar with either the regulating entity or their responsibilities

as water suppliers (dePeiza 1990, Terry 1990, Gottlieb 1990). Their estimates for a good response with this type of population ranged between 25 and 50 percent. The Lead in NTNC Schools total response rate of 45 percent falls on the high side of this range. The 22% technical assistance attendance rate falls squarely within the 10 to 30 percent range judged by these persons to be the lowest possible response rate possible before aborting a training/technical assistance methodology.

Why is such a low attendance rate considered acceptable? DEP/DWS must achieve compliance from all NTNC schools, not just a percentage of them. Schools which do not respond to training or technical assistance must either be visited by DEP/DWS Regional personnel or sent a Letter of Non-compliance, meant to stimulate response through the threat of fines. Both of these processes take up a considerable amount of employee time. Visiting a NTNC school not only takes the time to inspect the system and draw water samples, but also the travel time to and from the facility. Producing Letters of Non-compliance takes both the time to compose the letter, and the additional time to process the letter through the various tracking systems within DEP/DWS. Multiplied by the 110 NTNC schools, the time commitment to achieve compliance in this way becomes unmanageable. A training or technical assistance process that captures any

portion of a target group will greatly reduce the effort needed to achieve compliance from non-attendees.

Conclusions

The Lead in NTNC Schools letter, phone calls made to each school facility, and technical assistance sessions produced a 45% response rate from NTNC schools. This response rate, while judged favorably by three water supply managers, indicates alternatives that could have more efficiently utilized the time of DEP Division of Water Supply personnel. Learning how to maximize compliance, while at the same time dealing with the wide range of size and expertise in NTNC water systems, is the largest problem that DEP/DWS must solve. My recommendations in Chapter V address this issue.

CHAPTER V

COMPREHENSIVE PROGRAM DEVELOPMENT

In this last chapter I present suggestions for an improved methodology for future technical assistance programs. The implementation methodology and pilot program results, in conjunction with the problems encountered before and during the technical assistance sessions, will be compared with the experiences of the Rural Water Resources Association, the Northeast Rural Water Association, and the Very Small Quantity Generators of Hazardous Waste program to provide a basis for this new methodology. Central to these recommendations is the efficient utilization of DEP/DWS time for future projects. Because the training materials used for implementation of the Department of Environmental Protection, Division of Water Supply's Lead in Schools Drinking Water program proved to be adequate, their development will not be discussed in this section.

Coordination

Based on the experiences of both the Division of Hazardous Waste and the Rural Water Resources program, the most efficient method for the DEP/DWS to implement future

programs with NTNC water suppliers would be to work more actively with the Rural Water Resources Program (RWRP), the Northeast Rural Water Association (NRWA), and the New England Water Works Association's (NEWWA) *Outreach* publication personnel. These organizations already spend more time working with small community systems than does DEP/DWS, so it is logical that NTNCs be included in group small system training when applicable subject matter is being covered. These organizations should also be brought into the implementation stage of new programs. They may be able to steer DEP/DWS away from obvious pitfalls, such as inappropriate timing of programs. This coordination could enhance program effectiveness through increased attendance of NTNCs and a lighter workload of post-training follow-up measures meant to capture the attention of non-attendees.

DEP/DWS must also develop contacts with union, professional, and town organizations with which the various types of NTNC water suppliers may work. Because the Department of Environmental Protection is often viewed by smaller water suppliers primarily as an enforcement agency, NTNCs may feel a closer affiliation with their professional agencies and be more likely to attend and/or comply with programs which these agencies co-sponsor. Examples of such organizations include the Small Business Association of New England (SBANE), the Association of Industries in

Massachusetts (AIM), and the School Superintendent's Association. AIM often holds environmental training for its members. The School Superintendent's Association produces a monthly newsletter which will print announcements free of charge. Local town organizations, such as boards of health, conservation commissions, and the Extension Service, should also be included. The experiences of both DEP/Division of Hazardous Waste and the Rural Water Resources Program have shown that contact with these organizations enhances the response rate from a target group.

After contacts have been made in these various organizations, the timetable for new DEP/DWS regulatory programs should begin with setting a tentative date for training sessions and discussing it with NEWWA, RWRP, and NRWA to determine appropriate times and locations. The cooperating professional organizations should then be notified. This planning should be done during the initial stages of regulation drafting, and definitely before training materials are finished. Volunteers can be secured for finalizing meeting location arrangements. All organizations should have adequate notice for including training times in newsletters or meeting agendas. The "personalized" attention for the NTNCs by their respective professional organizations should encourage response to DEP/DWS mailings.

Bits and pieces of the framework for this coordination have been tried and proven effective. RWRP has developed a network with local Boards of Health, Conservation Commissions, etc. to help small communities find grant money to enact waterworks projects. Though this grant money would not be available to NTNC water suppliers that are businesses, this money may be available to NTNC schools and RWRP would be happy to expand their work to include them (Cady 1990). The Northeast Rural Water Association, which provides training and technical assistance to small community water systems, has already developed training programs in conjunction with the New Hampshire state water supply agency and wants to expand its work in Massachusetts. This training could be expanded to include NTNC water systems. All that is necessary is a coordinator at the State level (Burns 1990).

The Department of Environmental Protection, Division of Water Supply, as the primacy agency in Massachusetts, must take the step to develop and expand training programs with the help of these agencies. After future training programs have been initialized in this manner, the next most important consideration is the form which the technical assistance sessions should take.

Sessions

The individualized technical assistance sessions, which had been designed to be the most important and helpful part of the lead testing program, did not encourage response in the way projected. Almost no analysis of results was done at the technical assistance sessions. Only 8 schools brought in lead testing results (3 with new results, 5 with old results). Seven of these schools had test results with acceptable lead levels which were obvious to both the person conducting the sessions and the school representative. Only results from one school required interpretation. Instead, technical assistance sessions were used by the schools to ask general questions about the lead testing program. In most cases, these questions were the same as questions asked over the phone. Holding a group training session where these questions could have been asked and answered at one time should greatly ease the time burden of similar programs.

For example, schools which had already tested for lead could question if the testing they had conducted was adequate, or if they would be required to test again. The training leader could fully explain why the schools were being asked to meet a lead standard which had not yet been finalized. Questions about the health effects of lead, how

probable lead contamination was in buildings, and how to prohibit a panic reaction from parents when they heard about the lead testing could have been answered more clearly and efficiently than explanations with individual NTNCs over the phone. The DEP/DWS representative could also have explained why only NTNC schools, and not all schools, were currently being requested to test.

Most importantly, in a group training session the methodology for testing could be graphically displayed and explained (i.e. why multiple water samples drawn after temperature changes were required and what these samples tell the water quality analyst), and would encourage the correct methodology to be used. Follow-up individualized sessions could be offered to those schools that receive confusing results from their testing.

Group training sessions could provide another benefit as well. It is possible that some schools were hesitant to attend the technical assistance sessions individually, or even to call DEP/DWS with questions, because they were unable to conduct testing immediately and were afraid DEP/DWS would take action against them if they drew attention to themselves. In this case, group training sessions could encourage these water suppliers to attend by providing a type of anonymous security within their peer

group. This could be an additional step towards contacting and training the most chronic non-compliers.

Individual technical assistance sessions could then be held on an elective basis for NTNC schools which experienced difficulties in interpreting their test results or deciding on corrective actions, should this be necessary. School representatives would be able to meet DEP/DWS representatives at the group training sessions, rather than at the individual sessions, as had been planned. Technical assistance sessions could be scheduled individually by schools which needed help with their testing results after they had completed testing. DEP/DWS would not have to set up a day in each region for these sessions.

Group training sessions would need the same or greater number of DEP/DWS representatives than did the technical assistance sessions. However, the number of general phone calls regarding the program should be reduced. The method of talking to school representatives face-to-face with visual aids, rather than information given over the phone, should improve individual understanding. This better understanding of why the program is being conducted and how to perform testing should encourage more schools to comply.

Budget Problems

While many larger water suppliers keep abreast of the impending regulations through various drinking water industry publications, most small water suppliers do not. Because of this, new regulatory obligations, such as the proposed Lead and Copper Rule, come as a complete surprise.

As I have already mentioned, many NTNCs think that they will never have to conduct more than sodium, nitrate, and bacteria testing. Because of this assumption they are financially unprepared for new testing requirements.

This problem could be eased in two ways. Notifications of new requirements by professional organizations could allow the NTNCs some preparation time before they are instructed by DEP/DWS to implement the new program. Also, the compilation of a three year time schedule that was updated and published yearly, listing not only current testing requirements, but also the proposed implementation dates of new testing programs, would help NTNCs with their long term planning. This would allow school districts and towns sufficient time to allocate funds and to increase school revenues if necessary.

Responsible Contact

DEP/DWS should instruct NTNCs to designate one person as the responsible contact for the water system. This person should be a certified drinking water operator, an appointed representative, or the legally responsible person for the water system. The NTNC should also have a certified drinking water operator, even if this person is not the designated contact. The contact person, in addition to his/her other functional title (should he/she have one) should be given a title such as "Environmental Coordinator" or "Drinking Water Coordinator" and his/her duties for managing the water supply should be written into the job description.

This arrangement will eliminate the problem, as experienced in the NTNC Lead in School's Drinking Water Program, of locating the person responsible for maintaining the drinking water system. It will also function to encourage attendance from persons who previously would be unpaid for training time that was not formally part of their job.

NTNC Program Coordinator

Finally, I recommend that one person at DEP/DWS be designated as the NTNC Program Coordinator. While gathering information for this thesis, I found that each person within

the Water Quality Assurance Program of DEP/DWS had some sort of information on previous NTNC training attempts, mailings, or statistics. Even though there is currently very little history of DEP/DWS work with NTNCs, it was difficult to find this information, and only the Program Manager was aware of the location and content of it all.

Currently, one Water Quality Assurance person is designated as the developer and coordinator for a new regulatory program. I do not suggest that this arrangement be changed. I suggest, instead, that until the pattern for training and working with Non-Transient Non-Community water systems becomes as systematic as for community systems, one Water Quality Assurance person become the NTNC "expert." This person will advise the developer of a new regulatory program how to design the training portion for NTNC systems, based on lessons from past attempts. With this arrangement, there should be less repetition of training methods which have already been proven ineffective. Now is the time, while the body of knowledge is being developed, to establish this centralization of information.

Implications for the Future

Because EPA does not currently provide funding to state agencies to fund activities focused on NTNC water suppliers, DEP/DWS will be unable to enact many of the recommendations

in this thesis. There is no funding for the State Coordinator position. There is no funding for enforcement of regulations for NTNCs. There is no funding for future training focused specifically on NTNC water suppliers. Only general EPA funding for an internship position enabled this project for NTNC schools to be carried out.

The NTNC water suppliers will also face problems due to the lack of grant monies for this class of water supply systems. As NTNCs are required to meet all regulations applicable to community water supply systems, they will be required to complete more extensive and costly testing. Construction of treatment facilities may be required to comply with some rules. There are no funds to aid NTNCs to meet these requirements as there are for community systems.

Three outcomes are immediately evident from this situation. First, NTNCs that are located in a common region may begin working together. NTNCs could share the services and costs of a certified operator to watch over their respective drinking water supply systems. Samples taken from each system could be sent as a group to testing labs, qualifying for the bulk discounts available from many certified laboratories.

As requirements become even more expensive, a second phenomena may occur. Systems may begin to physically combine in order to share more expensive testing and treatment costs. This regionalization is particularly likely in towns without a public water supply system, but with many NTNCs. The expense for compliance of individual non-community systems could catalyze the formation of a new community system. Because this consolidation of systems would lessen the total number of systems that DEP/DWS must track for compliance, this would be a favorable occurrence.

The third possible outcome is probably the most likely and least desirable. If state and federal aid remains unavailable to NTNCs, massive non-compliance will occur. Some entities will do nothing, betting on the fact that the state will also have no money to enforce their compliance. Other entities, because they are financially unable to comply, may relocate or, if pressured by the state to comply, go out of business. Still other entities, such as daycare centers, may physically divide their operational quarters in order to fall below the limit of 25 people which qualifies them as a NTNC.

EPA must be willing to provide funding or funding mechanisms which will enable both the state primacy agencies and NTNC systems to meet future requirements. If this aid

does not materialize, there will undoubtedly be massive non-compliance by NTNCs with future regulations, and organizations such as DEP/DWS will not have the resources to correct the situation. The sooner EPA provides funding, the sooner states will be able to set up programs specifically designed to meet the regulatory needs of NTNCs, such as the one I have suggested here. The longer this funding takes, the longer more inadequately designed and enacted regulatory programs will persist. Both the state agencies and NTNCs will become increasingly disillusioned with the sincerity of the EPA commitment to ensure safe drinking water for consumers.

Summary

The development of a NTNC training program, based on the cooperative efforts of many different entities which have similar goals, is crucial to the regulatory process for providing safe drinking water to the people served by these small water suppliers. The implementation of a coordinated program promises a stable, longlasting effort which will provide the type of coordinated guidance inexperienced NTNC water suppliers need. Though many of the suggestions presented in this thesis require a great deal of initiation, time, and money, I think that in the years ahead this time and money will prove to be well spent. Time spent

coordinating and streamlining efforts among different agencies will eliminate duplication of effort and allow more comprehensive programs to be initiated.

I cannot stress how important coordination will be in the future. As compliance with new, increasingly complex and expensive regulations becomes required of NTNCs, non-compliance will increase. This will largely put the burden of correcting the situation on the state regulating agency, in this case the Massachusetts Department of Environmental Protection. The staff of DEP/DWS will be unable to help over 500 NTNC water suppliers, a number which may increase over time, in addition to the agency's other duties. EPA must provide the funding to enable this coordination to happen. Coordination between existing agencies and organizations to share in the initiation of future compliance programs is the only way to ensure safe drinking water for people served by Non-Transient Non-Community water suppliers.

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APPENDIX A

Daniel S. Greenbaum
Commissioner

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Protection
Division of Water Supply
One Winter Street, Boston, Mass. 02108

11-14-89

Re: Lead in School Drinking Water

Dear Superintendent:

According to the Drinking Water Regulations of Massachusetts (310 CMR 22.02) your water system is considered a Non-transient Non-community water system (NTNC). A NTNC drinking water system is a system which regularly serves 25 or more people approximately 4 or more hours per day, 4 or more days per week for more than 6 months or 180 days per year. As a water supplier, the Department of Environmental Protection (DEP), (formerly the Department of Environmental Quality Engineering), Division of Water Supply, has determined that you will be responsible for complying with proposed regulations by the Federal Environmental Protection Agency (EPA) for lead and copper that aim to lower the level of lead and copper consumed through drinking water. In addition, the EPA Lead Contamination Control Act (LCCA) requires that possible lead problems in schools' drinking water be identified and resolved. (Special emphasis is placed on the identification and removal of water coolers that are not lead-free.)

As a water supplier to children, who are extremely susceptible to lead consumption, the DEP has selected you for help in preparing for these regulations. The DEP is concerned about lead consumed by children because even small doses of lead can be harmful for children. As you know, comparatively low levels of exposure have been linked to damage of the central and peripheral nervous system, learning disabilities, shorter stature, impaired hearing, and impaired formation and function of blood cells.

The DEP has developed a program to assist you in eliminating high levels of lead and copper from your school water. The program includes: 1) evaluation of your distribution system. 2) removal of all EPA listed lead-lined water coolers. 3) collection and analysis of water samples. 4) interpretation of the results by DEP at technical assistance sessions. 5) remediation. To comply with this sampling program, you must sample for lead, copper and pH where the water enters the school building and at each point where water is used for drinking and cooking, such as kitchen faucets, drinking fountains, and water coolers. Attachment A lists water coolers identified by the EPA as containing lead. If any of these coolers are found, they should be removed. Note that this list is <u>not</u> complete, and other water coolers may also contain lead.

Instructions for testing have been included in Attachment B of this letter and the DEP Division of Water Supply will be available to meet with school representatives to analyze results and to discuss solutions if any problems are found. Please request that a copy of your results be sent by the certified lab you contact (see Attachment C) to your regional office listed below. This will enhance the quality of your consultation session.

For your school water system to be in compliance with the proposed rule, the Division of Water Supply is looking for the following results:

1. Samples taken where the water enters the school must meet the levels of .005 mg/l for lead and 1.3 mg/l for copper.
* 2. All other samples must have an average lead level less than or equal to .01 mg/l with no single sample greater than .02 mg/l: and
3. No more than 5% of the samples can contain greater than 1.3 mg/l of copper.

To help you with the interpretation of your test results and decisions for remedial action, the DEP Division of Water Supply will hold consultation sessions at each region on the following days. Please call the contact person to schedule your consultation session:

Northeast Regional Office 5 Commonwealth Avenue Woburn, MA (617) 935-2160 Contact: Paul Anderson	January 16
Southeast Regional Office Lakeville Hospital Lakeville, MA (508) 946-2760 Contact: Lee Tripp	January 18
Central Regional Office 75 Grove Street Worcester, MA (508) 792-7650 Contact: Gene Burnell	January 19
Western Regional Office 436 Dwight Street Springfield, MA (413) 784-1100 Contact: Paul Nietupski	January 17

* NOTE: EPA is currently considering .01 mg/l as the accepted level at each faucet, rather than .02 mg/l. Please consider this when deciding system improvements

Bring to the meeting your sample test results and the plumbing distribution blue prints for your school, if available. This information will enable the DEP staff person you meet with to more effectively and accurately recommend corrective measures needed by your system.

The Lead Contamination Control Act also requires that you make lead testing results available to the public; including teachers, other school personnel, and parents. This will engender confidence in your school's effort to provide safe drinking water and may also solicit offers of assistance to help you with the cost and labor involved in this program. A sample notification letter is enclosed as Attachment D for your reference and use.

If you have any further questions, please feel free to contact Ms. Julie Smith at the Division of Water Supply, Boston Office, (617) 292-5875.

Sincerely,

David Y. Terry
Acting Director
Division of Water Supply

attachments

cc: Regional Section Chief
Kevin Reilly, USEPA
Local Board of Health (without attachments)
Louis Visco, MA Plumbing Board

(PC:mm:dln/schoollead)

ATTACHMENT A

LIST OF WATER COOLERS THAT ARE NOT LEAD FREE*

Halsey Taylor Company

The Halsey Taylor Company reported use of lead solder in numerous models of water coolers manufactured between 1978 and the last weeks of 1987. The model numbers are:

WMA-1; SWA-1; S3/5/10 C&D; S300/500/1000D; SCWT/SCWT-A; DC/DHC-1; HWC7/HWC7-D; BFC-4F/7F/4FS/7FS; 5656 FTN*; 5800 FTN*; 8880 FTN*

* With cusp connection

EBCO Manufacturing Company

The EBCO Manufacturing Company (whose products are also marketed under the names "Oasis", "Kelvinator", and "Aquarious" and were also marketed by Westinghouse Corp.) identified four categories of drinking water coolers which are not lead free, as defined by the LCCA.

The first category consists of all pressure bubbler water coolers with shipment dates from 1962 through 1977. These units contain one 50-50 tin-lead solder joint on the bubbler valve. Model numbers are not available for products in this category.

The second category consists of pressure bubbler coolers produced from 1978 through 1981. These units each had one 50-50 tin-lead solder joint. The model numbers are:

CP3	CP3-50	CP3H	CP5	CP10
CP10-50	7P	13P	13PL	DP20
DP20-50	DP3R	DP3RH	DP8A	DP8AH
DP13A	DP13A-50	DP14A-50/60	DP10X	C10E
WFE10	PX-10	DP12N	DP15W	DP5M
DP7M	DP7MH	DPM8	DPM8H	DP13M
DP13M-60	DP14M	DP15M	DP16M	CP3M
CP5M	DP15MW	DP5S	DP7S	DP13S
DP14S	DP7SM	DP13SM	DP7WM	DP7WMD
DP5F	DP10F	EP5F	EP10F	WTC10
WEEC03	WEEC05	WEEC07	WEEC10	WEEC13
WEEH03	WEFC03	WEFC08	WEFC10	WEFC13
WEFC15	WEFC20	WEFC13-OX	WEFC20-OX	WEKC05-OX
WEFH03	WEFH08	WEKC03	WEKC05	WELC05
WELC07	WELC08	WELC13	WELC14	WELC15
WELC16	WELH07	WELH08	WEMC07	WEMC13
WW07T	WEFH03	WEFH08	WEPC05	WERC05
WERC07	WERC13	WETC05	WETC10	WEWC07
WEEC03-OX	WEEC10-OX			

* As published by the U.S. Environmental Protection Agency

II. List of Drinking Water Coolers with Lead-Lined Tanks

EPA has tested a limited number of water coolers from various manufacturers by cutting them open to determine whether they contain lead-lined tanks. EPA has found at least one unit of each of the model numbers identified on the list in section III of this FEDERAL REGISTER notice to contain a lead-lined tank. Specifically, EPA's Water Engineering Research Laboratory (WERL) in Cincinnati, Ohio, examined twenty-two water coolers provided them by the U.S. Navy. The WERL determined that the linings of nine of these water tanks contained lead. Each of the nine coolers with lead-lined tanks was manufactured by Halsey Taylor, but two of the units had no model or serial number identification tags. Two additional drinking water coolers submitted by the Portland, Maine, School District were examined by EPA and found to contain lead-lined water tanks. They were also manufactured by Halsey Taylor. The EPA is unable to determine how many other coolers within each model number contain a lead-lined tank. The model numbers and corresponding serial numbers of the tanks found to contain a lead lining are as follows:

Halsey Taylor WM8A: 838269; WT8A: 66 421303; WT8A: 66 421268; GC10ACR: 65 361559; GC10A: 69 598593; GC10A: 142378; GC10A: 113383; GC5A: 142646; RWM13A: 834774.

The following is a list of model numbers of the drinking water coolers having lead-lined water tanks that have been identified to date.

MODEL NUMBERS OF THE WATER COOLERS FOUND AS OF MARCH 1989 WITH LEAD-LINED TANKS

BRAND	MODEL NUMBERS
Halsey Taylor	WM 8A
Halsey Taylor	WT 8A
Halsey Taylor	GC 10ACR
Halsey Taylor	GC 10A
Halsey Taylor	GC 5A
Halsey Taylor	RWM 13A

The third category consists of bottled water coolers with shipment dates from 1962 through 1977 with model numbers CBI(H) and DB1R(H). These units may have one 50-50 tin-lead solder joint.

The fourth category consists of bottled water coolers produced between 1978 and 1981 with model numbers DB2 and DB1R(H). These coolers contain one 50-50 tin-lead solder joint.

Sunroc Corporation

The Sunroc Corporation reported the use of lead solder as a secondary seal on the connecting lines in a limited number of bottled water coolers manufactured between 1979 and 1983. Model numbers reported include USB-1, USB-3, T6Size 3, BC, and BCH.

ATTACHMENT B

HOW DO YOU EVALUATE WHETHER YOUR BUILDING IS AT RISK FOR DRINKING WATER BORNE LEAD?

If you answer "yes" to 2 or more of the following questions your facility or unit is probably at <u>some</u> risk for water-borne lead and must sample.

	YES	NO
1. Are there any lead or brass pipes in your building?	___	___
2. Are there copper pipes joined with leaded solder in your building?	___	___
3. Was your building built before 1940?	___	___
4. Was your building built between 1983 and 1986?	___	___
5. Was your plumbing done between 1983 and 1986?	___	___
6. Have you had complaints on water staining of fixtures?	___	___
7. Does your water stand stagnant in your pipes for 6 hours or more?	___	___

SAMPLING PROTOCOL

Equipment: Contact a certified lab from the following list to obtain sample bottles and arrange for the samples to be analyzed. You will need 3 sample bottles for the tap closest to the point where the water enters the building and 2 samples for every other sampling location.

Labeling: Mark the location of each sample, and the order of collection, clearly on each sample bottle to enable easy analysis of test results. (Also mark this information on the blue print or sketch of the plumbing system.) The metal type of the fixture sampled as well as the type of piping closest to the fixture should also be noted (e.g. brass, copper, etc.)

Time: Samples should be taken after the water has been sitting for at least 6-8 hours (overnight). The time between samples at each site will determine if the lead is coming from the fixture or from the plumbing.

SAMPLE COLLECTION

1. Tap closest to entry point of water into school building.

* 1st sample - take the first sample immediately on opening the tap, first thing in the morning before any water has been used.

2nd sample - run the water until the collector feels the water temperature change, approximately 3 minutes, then collect the second sample.

3rd sample - run water for 10 minutes and then collect a third sample.

2. Sampling kitchen and drinking water fixtures (e.g., water coolers, bubblers, old bottled water dispensers).

1st sample - collect the first water to come out of each fixture first thing in the morning, before any water has been used.

2nd sample - run water for 3 minutes (or 15 minutes if the fixture has a water cooling tank) and then collect the 2nd sample.

* pH testing must be conducted on this sample only.

ATTACHMENT C

LABORATORIES CERTIFIED BY MASS D.E.P.
FOR ANALYSIS OF TRACE METALS (INCLUDING LEAD)
IN DRINKING WATERS AS OF MAY, 1989

LAB NAME AND ADDRESS	I.D. NUMBER, DIRECTOR TELEPHONE NUMBER
Barclay Chemical Co. 150 Coolidge Ave. Watertown, MA 02172	MA004 Richard Traverse 617-926-3400
Arnold Greene Testing Labs, Inc. 6 Huron Drive Natick, MA 01760	MA007 Donald Cowan 508-235-7330
Whitman & Howard Lab 45 William Street Wellesley, MA 02181	MA008 Robert Hankinson 617-237-5000
Barnstable County Health Dept. Lab Route 6A Superior Court House Barnstable, MA 02630	MA009 Eric Butler 508-362-2511
ESA Laboratories 43 Wiggins Ave. Bedford, MA 01730	MA010 Paul A. Ullucci 617-275-0100
Camp, Dresser, & McKee, Inc. One Center Plaza Boston, MA 02108	MA012 James Ochialini 617-742-5153
Tighe & Bond Lab 30 Payson Avenue Easthampton, MA 01027	MA014 Kathleen Simmons, PhD 413-533-3991
Briggs Associates, Inc. 400 Hingham Street Rockland, MA 02370	MA015 Leanne E.F. Cobb 617-871-6040
Clean Harbor Analytical Services 213 Burlington Road Bedford, MA 01730	MA017 Arthur Clark 617-275-6111
ENSECO 205 Alewife Brook Pkwy. Cambridge, MA 02138	MA020 Dennis Flynn 617-661-3111
Lycott Environ. Research, Inc. 600 Charlton Street Southbridge, MA 01550	MA021 Lee Lyman 508-765-0101

Oliveria Environmental Labs 176 Plymouth Street Bridgewater, MA 02324	MA022 Victor Oliveira 508-697-2659
Cambridge Analytical Assoc 1106 Commonwealth Ave. Boston, MA 02215	MA023 Linda Leonard 617-232-2207
Skinner & Sherman Labs, Inc. 300 Second Ave. Waltham, MA 02154	MA024 Dr. Haldean Dalzell 617-890-7200
GHR Analytical 26 Main Street Lakeville, MA 02346	MA030 Daniel Ostrye 508-947-5077
Clean Harbors Analytical Services 325 Wood Road Braintree, MA 02184	MA032 Dr. Richard Fix 617-849-1800
New England Chemical Works 210 Williams Street Dighton, MA 02764	MA035 Hans Stoeckler 508-823-0885
ENSR Laboratory 33 Industrial Way Wilmington, MA 01887	MA037 Marilyn Hoyt 508-657-4290
Eastern Analytical Labs 149 Rangeway Road Billerica, MA 01862	MA038 Michael Wheeler 508-272-5212
Thorstenson Labs, Inc. 66 Littleton Road Westford, MA 01886	MA048 Peter Thorstensen 508-692-2051
Stevens Water Analysis 38 Montvale Avenue Stoneham, MA 02180	MA052 Alan Stevens 617-438-6114
Water Control Lab 106 South Street Hopkinton, MA 01748	MA059 James Todaro 508-435-6824
Certified Engineering & Testing Co., Inc. 25 Mathewson Drive Weymouth, MA 02189	MA069 Mark Grant 617-337-7887
Millipore Corp. 80 Ashby Rd. Bedford, MA 01730	MA070 Steven Boyer 617-275-9200

Waterworks Lab 60 Elm Hill Ave. Leominster, MA 01453	MA076 Eric Koslowski 508-534-1444
Dennison Environmental 35 Industrial Parkway Woburn, MA 01801	MA079 James Skrabak 617-938-8508
Revet Environmental & Analytical Lab 365 Plantation St. Worcester, MA 01605	MA082 Virginia Taylor 508-753-3738
Alpha Analytical Labs 8 Walkup Drive Westboro, MA 01581	MA086 Scott McLean 508-898-9220
Jet-Line Analytical Laboratory 263 Howard Street Lowell, MA 01852	MA091 Gina Tyros 508-937-7294
R.T.I., Inc. 65 Newcomb St. Attleboro, MA 02703	MA093 Sandra Conley 508-226-1950
Ionics Corp. 65 Grove Street Watertown, MA 02172	MA095 Charles Swenson 617-926-2500
Hydrosample 367 West Main St. Northboro, MA 01532	MA097 Kimberly Tisa 508-393-7222
Chem Test Lab 11 Locke Street Haverhill, MA 01830	MA098 Robert Durbin 508-372-1051
Con-Test Lab 39 Spruce St. East Longmeadow, MA 01028	MA100 Edward Denson 413-525-1198
Energy & Environmental Engineering, Inc. 35 Medford St. Somerville, MA 02143	MA101 Phillip Doherty 617-666-5500
Analytical Testing Lab Co., Inc. 30 Shawsheen Avenue Bedford, MA 01730	MA110 Peter Stavropoulos 617-275-1599
Heatbath Corp. 107 Front St. Indian Orchard, MA 01151	MA111 Herbert Brummer 413-543-3381

E.C. Jordan
261 Commercial St.
Portland, ME 04112

ME019
Richard A. Rozene
207-775-5401

GTEL Environemntal Labs
Meadowbrook Industrial Pk
Milford, NH 03035

NH011
Dr. Larry Jackson
603-672-4835

Resource Analysts, Inc.
1 Lafayette Road
Hampton, NH 03842

NH022
Russell D. Foster, Jr.
603-926-7777

New England Testing Laboratory
1254 Douglas Ave.
No. Providence, RI 02904

RI010
Mark H. Bishop
401-353-3420

Rhode Island Analytical Labs
231 Elm Street
Warwick, RI 02888

RI015
Anthony Perrotti
401-467-2452

Alpha Analytical
55 Access Road
Warwick, RI 02886

RI029
David Dickinson
401-738-8202

SCITEST Laboratory Services
Route 66, P.O. Box 339
Randolph, VT 05060

VT006
Roderick J. Lamothe
802-728-3379

DN:aar
DNCERTLAB

ATTACHMENT D

NOTIFICATION LETTER

Date

Attention:

The [name of school] conducted testing of its water supply system on [date] to determine that lead levels meet the safety standards determined by the US Environmental Protection Agency and the Massachusetts Department of Environmental Protection (MDEP). The MDEP has aided the school with both testing procedure and analyzing test results.

This testing was conducted as a guarantee of the quality of the school's drinking water and to ensure the safety of students, teachers, and other school personnel.

☐ a. We are happy to inform you that lead levels are well within the safety limits set by the US Environmental Protection Agency.

-OR-

☐ b. Slightly elevated levels were found at several locations, but have been corrected by:

- ☐ 1. taking water fountain(s) out of service.
- ☐ 2. providing bottled water until plumbing corrections can be made.
- ☐ 3. other [See DEP recommendations from your technical training session]

This action has been taken after consultation with the Massachusetts Department of Environmental Protection

Test results are available at [location] for your perusal. If you have any questions, please contact [name] at [phone #].

Sincerely,

[Superintendent]

cc: DEP Regional Office
NOTIF

APPENDIX B

NTNC SCHOOL RESPONSES

PWSID	SCHOOL NAME	VLNTRY SIGNUP	PHONE CALL	SAID COME	SAID SEND RESULTS	SAID TEST IN FUTURE	ATTENDED SESSIONS: CURRENT RESULTS	ATTENDED SESSIONS: OLD RESULTS	ATTENDED SESSIONS: FOR HELP	SENT OLD RESULTS	SENT NEW RESULTS	SENT LETTER ONLY
1006001	Alford School		1			1						
1043014	Brimfield Elementary Sch.											
1047000	Mohawk Trail Region. Sch.		1		1					1		
1053007	Hawlemont Regional		1							1		
1060001	Davenport school		1		1						1	
1063008	Clarksbury Elementary											
1066004	Gill Elementary School											
1074005	Eaglebrook School											
1098004	Abbott Mem. School											
1108008	Goshen Ctr School		1		1						1	
1111006	Granby Jr. Sr. High Sch.		1									
1111014	East Meadow School		1							1		
1111016	West St. School									1		
1112004	West Granville School		1									
1112006	Granville School		1							1		
1113013	Rudolf Steiner School											
1113016	Monument Mt. Regional HS		1	1								
1120011	Green Meadows School											
1135008	Holland Elem. School											
1143008	Gateway Regional School		1		1							
1154001	Leverett Elementary Sch.		1									
1156001	Leyden Elem. School											
1183001	Middlefield Elementary Sch.		1		1							
1203011	New Marlborough Central Sch.											
1204001	Swift River School											
1217002	Pioneer Valley Regional		1			1						
1225028	Otis Consolidated Schools		1									
1234009	Center School											
1249004	Richmond Consolidated Sch.											
1260006	Sandisfield public school		1	1						1		
1263008	Savoy School Dept.											
1267008	Mount Everett School		1			1						
1267004	Ashley Falls School											
1272002	Shutesbury Elem School		1							1		
	Shutesbury Preschool									1		
1283013	Berkshire County Day Sch.											
1306004	Wales Elementary Shcool		1		1							1
1312003	Warwick Flem School											
1331002	Superintendent of Schools		1		1							
1331008	Hampshire Reg. School Dist		1		1						1	
1394073	Westport Country Day Sch.											
1341010	Mt. Greylock Regional Sch							1				
1345002	Crane Community School											
	TOTAL		21	2	8	3	1	0		8	3	1	0

PWSID	SCHOOL NAME	VLNTRY SIGNUP	PHONE CALL	SAID COME	SAID SEND RESULTS	SAID TEST IN FUTURE	ATTENDED SESSIONS: CURRENT RESULTS	ATTENDED SESSIONS: OLD RESULTS	ATTENDED SESSIONS: FOR HELP	SENT OLD RESULTS	SENT NEW RESULTS	SENT LETTER ONLY
2012002	Ashby Elementary School											
2015001	Harvard Forest		1	1			1					
2028004	First Parish Nursery Sch.		1		1							
2028005	Berlin Memorial School		1	1								
2084009	Emerson School											
2084010	Nashoba Reg. High School		1		1						1	
2054013	City Grade School		1	1								
2054014	Charlton Elem. School		1	1						1		
2054015	Charlton Intermediate Sch.		1	1								
2054047	Heritage School		1							1		
2054031	Bay Path Reg. Voc Tech HS		1	1								
2140004	Hubbardston Center School											
2179004	Nipmuc Regional High Sch		1									
2179005	Henry P. Clough		1									
2188001	Longfellow School		1		1							
2202002	New Braintree Grade Sch		1									
2222001	Oakham Center School		1									
2234006	Center School											
2235002	Phillipston Memorial Sch.		1						1			
2286005	Hale School		1		1						1	
2286006	Pomposetticut School		1								1	
2286007	Center Schools		1								1	
2287008	Tantasqua Regional H.S.		1			1						
2290007	Sutton Jr. & Sr. High School		1			1						
2290008	Sutton Elementary School		1			1						
2290009	Sutton Junior High School		1			1						
2301003	Jocelyn Day School											
2301014	Winslow School		1		1						1	
	TOTAL		23	6	5	4	1	1	2	1	4	0
3088008	Spofford Pond School		1						1			
3088009	Harry Lee Cole School		1	1					1			
3061004	Carlisle Public School											
3184012	Wreath Scool Inc.		1			1					1	
3269011	Pine Hill School											
3342001	Millbrook Country Day Sch, Inc.											
	TOTAL		3	1	0	1	0	0	2	0	1	0

PWSID	SCHOOL NAME	VLNTRY SIGNUP	PHONE CALL	SAID COME	SAID SEND RESULTS	SAID TEST IN FUTURE	ATTENDED SESSIONS: CURRENT RESULTS	ATTENDED SESSIONS: OLD RESULTS	ATTENDED SESSIONS: FOR HELP	SENT OLD RESULTS	SENT NEW RESULTS	SENT LETTER ONLY
4003003	Ford Middle School											
4027003	Berkley Middle School										1	
4052006	Benjamin Ellis Pre-School							1			1	
4052007	Gov. John Carver Schools							1			1	
4052011	Capt. Pal Preschool											
4076003	Dighton-Rehoboth Reg H.S											1
4086002	Eastham Elementary Sch.		1						1			
4086006	Nauset Regional High		1						1			
4102003	G.R. Austin Middle School										1	
4102008	Freetown Elementary Sch.											1
4145001	Sacred Heart High School											
4146007	Assawompset School		1								1	
4172006	Mashpee Middle School		1		1							
4172029	David School		1		1							
4239003	The New Testament Church		1									
4239017	South Elem. School		1	1				1				
4239030	The Baird Center		1			1						
4239039	South High Vocational HS		1	1				1			1	
4240004	Dennett Elementary School										1	
4247001	Anawan School											1
4247002	Dighton-Rehoboth Reg Sch											1
4247004	North Rehoboth School		1	1								1
4247005	Palmer River School		1	1								1
4247025	Christian Life Fellowship		1	1					1			
4247028	Cedar Brook School		1	1								
4250002	Rochester Memorial School										1	
4250003	Old Colony Reg. Voc. H.S.										1	
4296005	West Tisbury Elementary Sch.		1	1							1	
4300015	Truro Central School						1					
4318037	Wellfleet Elem. School		1						1			
4334004	Macomber School											
4334009	Administration Bldg.											
4334010	St. George School											
4334017	Westport Elementary Sch.		1		1							
	TOTAL	2	16	7	3	1	1	4	4	3	7	6

SCHOOLS	111
NEW	2
CLOSED	3
TOTAL SCHOOLS	110

TOTAL ATTENDING SESSIONS	24
TOTAL SENDING RESULTS	20
TOTAL SENDING LETTERS	6
TOTAL RESPONSE	50
PERCENT TOTAL RESPONSE	0.45
PERCENT ATTENDING SESSION	0.22

APPENDIX C

FOLLOW-UP CALLING
FOR LEAD IN SCHOOL'S DRINKING WATER TESTING

ADVICE: Ask to talk to the school superintendent or principal.

BLURB: I am calling from DEP, Division of Water Supply regarding the requirement for your school to test for lead in your school's drinking water. Are you the person I should be talking to?

Jot down the school's name and the name of the person who you speak with, then ask the following questions.

1. Did you receive the letter from DEP dated 11-14-89?

2. Have you conducted lead testing of your school's drinking fountains and taps?

If YES, are you attending the session next week?

If NO, inquire why and recommend they attend if this seems appropriate to the situation

If NO, why haven't they tested?

(at this point, tell them that DEP is requiring that they submit a two year plan which details when they will both test and remediate any possible problems. If the number of coolers is a problem or they are uncertain of how to complete this plan, recommend that they reserve space at the training session)

(dln:mm:followup)

FOLLOW-UP CALLING
FOR LEAD IN SCHOOL'S DRINKING WATER TESTING

ADVICE: Ask to talk to the school superintendent or principal.

BLURB: I am calling from DEP, Division of Water Supply regarding the requirement for your school to test for lead in your school's drinking water. Are you the person I should be talking to?

School _____

Contact _____

1. Did you receive the letter from DEP dated 11-14-89?
_____ yes _____ no

2. Have you conducted lead testing of your school's drinking fountains and taps?

___ If YES, are you attending the session next week?
____ YES

____ If NO, inquire why, tell them to send a copy of their results to the Boston office, and recommend they attend the technical assistance session if this seems appropriate to the situation

___ If NO, why haven't they tested?

(at this point, tell them that DEP is requiring that they submit a two year plan which details when they will both test and remediate any possible problems.)

3. Do you desire help in completing a plan which will be acceptable to DEP (e.g. how to phase in coolers for testing and take interim precautionary measures)? ____ yes ____ no

If YES, recommend that they reserve space at the training session

(dln:mm:followup)