



Pennsylvania Department of Environmental Protection  
Bureau of Water Standards and Facility Regulation



Safe Drinking Water Program  
Lead Ban Surveillance Project 2006

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## **Background Information**

Lead is a metal commonly found in the environment that is toxic to humans. Exposure to lead through inhalation or ingestion can lead to serious health problems such as kidney damage, high blood pressure or severe damage to the brain and nervous system. Unlike many contaminants, lead is not excreted from the body; it is stored in the skeletal system. This means that even low doses can be dangerous. No amount of lead has been found to have a beneficial effect on the body. Those most at risk of health problems due to lead exposure are young children, pregnant women and the elderly.

Corrosion is the most common cause of lead contamination in drinking water. Water that contains a low pH, low mineral content or the presence of dissolved oxygen in the water is considered to be corrosive. Corrosive water leaches the lead out of leaded pipes and solders. Before the Plumbing System Lead Ban and Notification Act was put into effect, as much as 40 percent of total lead exposure came from ingestion of lead dissolved in drinking water. Today that number has dropped to about 20 percent.

## **The Plumbing System Lead Ban and Notification Act**

The Pennsylvania Plumbing System Lead Ban and Notification Act, Act 1989-33 (Lead Ban Act) was enacted in an effort to strengthen the provisions of the PA Safe Drinking Water Act in order to remain consistent with the Federal Safe Drinking Water Act Amendments of 1986. The Lead Ban Act further safeguards our public drinking water systems from harmful levels of lead. Act 1989-33 was signed into law on July 6, 1989 and went into effect on January 6, 1991. One of the main purposes of this law was to “protect public health and safety by prohibiting the sale of certain materials commonly used in plumbing system construction, modification, and repair,” including leaded solders, pipes, pipe fittings, and fixtures. This is accomplished by prohibiting the use of pipes, pipe fittings, solders or flux in the construction, modification or repair of any plumbing system that is not lead free. Solder and flux must contain no more than 0.2 percent lead to be considered lead free. Pipes, pipe fittings, and fixtures are considered lead free if they contain no more than 8.0 percent lead. The Act further prohibits both the sale and use of 50/50 and 85/15 tin-lead acid and solid core solders and acid and solid core solders that do not have a label stating the percent of lead in the solder, such as commercial grade solder. All other leaded solder is restricted to non-plumbing use only.

The second important objective of Act 1989-33 was to “provide for notice of the potential for leaded contamination of drinking water consumed by users of public water systems.” The Department of Environmental Protection (DEP) has been granted the power and authority to administer and enforce Act 1989-33, which was written in compliance with the lead ban provision of the Federal Safe Drinking Water Act Amendments of 1986.

## **Implementation of the Law**

During the eighteen months between the signing and enactment of the Lead Ban Act, the Bureau of Water Supply and Wastewater Management (now the Bureau of Water Standards and Facility Regulation) developed the Pennsylvania Lead Ban Surveillance Program in order to eliminate the availability of leaded solders used for plumbing purposes. A public outreach campaign was also designed to educate those audiences affected by the ban, including: distributors, retailers, manufacturers, public water suppliers, plumbers and plumbing contractors. The campaign informed the public about the environmental and health effects of lead in drinking water through media reports and the distribution of pamphlets, fliers and newsletters.

Presently, the Bureau of Water Standards and Facility Regulation hires a summer intern to implement the Lead Ban Surveillance Program. The main focus of the Surveillance Program is to conduct compliance checks, or surveys, on retail facilities where plumbing supplies are commonly sold to ensure compliance with the Lead Ban Act by eliminating the availability of banned leaded solders. Surveys are conducted primarily at hardware stores, home centers and general department stores. Approximately 20% of retail stores in Pennsylvania are inspected each year.

## Solder Description

Solder is a metallic compound used to seal or join metallic surfaces. There are two aspects by which solder is classified, the core type and composition. The core is composed of rosin flux, acid flux or solid metal. Flux acts as a pretreatment to the metal being soldered, to help the solder stick and hold. Acid or solid core solders are usually preferred for plumbing purposes. The composition of solder is the percentage of metals contained in the solder. Some common solders, their composition and uses can be found in Table 1.

**Table 1:** Common Solders and Their Uses.

Percent Tin (Sn)	Percent Lead (Pb)	Percent Antimony (Sb)	Percent Silver (Ag)	Intended Uses
85	15			Plumbing, general purpose, (rare)
50	50			Plumbing, auto repair, stained glass, general purpose
60	40			Electrical repair, general purpose, stained glass
40	60			Plumbing, general purpose
30	70			Auto body and radiator repair
95		5		Lead free, plumbing
95			5	Lead free, plumbing
5			95	Lead free, plumbing
			100	Lead free, plumbing
?	?	?	?	Commercial grade, general purpose

The status of the solder is based on the composition and core. The Lead Ban Act states that 50/50 and 85/15 tin-lead acid and solid core solders are banned from sale or use in Pennsylvania. Other banned solders include acid and solid core leaded solders that are not labeled as to the percent lead or leaded solders that do not contain the required warning statement. Stores found selling banned solders are in violation of the Lead Ban Act. All other solders that contain lead (including 50/50 and 85/15 rosin core solders) and are properly labeled are considered restricted and may be sold. However, restricted (leaded) solders cannot be located in the plumbing section of a store. Restricted solder sold in the plumbing section of a facility is considered “restricted out of place” and is also a violation of the Lead Ban Act. Lead free solder may be sold anywhere in a facility. The status of solders based on their composition and core can be found in Table 2.

**Table 2:** Solder Status Based on Composition and Core.

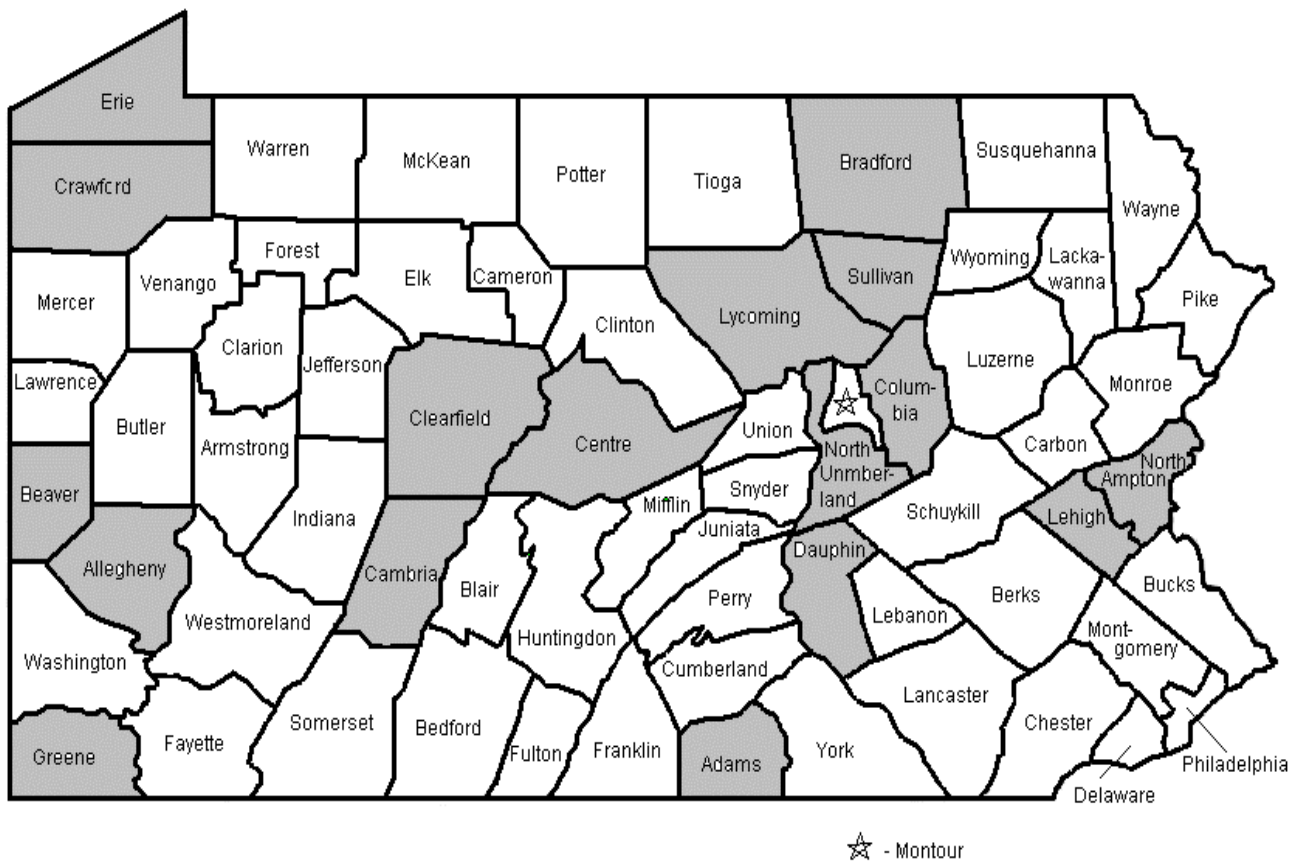
<b>Tin-Lead Composition</b>	<b>Core</b>	<b>Status</b>
? Commercial grade	Solid	Banned
? Commercial grade	Acid	Banned
50/50	Solid	Banned
50/50	Acid	Banned
85/15	Solid	Banned
85/15	Acid	Banned
? Commercial grade	Rosin	Restricted
50/50	Rosin	Restricted
85/15	Rosin	Restricted
60/40	All	Restricted
40/60	All	Restricted
30/70	All	Restricted
15/85	All	Restricted

## **Internship Project**

The primary purpose of the internship project is to implement the Lead Ban Act and eliminate the availability of banned leaded solders. Interns employed by the Bureau of Water Standards and Facility Regulation conduct surveillance activities in order to ensure compliance with the Ban of Sale provision of the Pennsylvania Plumbing System Lead Ban and Notification Act.

The internship project began in the summer of 1992 and continued in the summers of 1993, 1994 and 1995. Inspections were not conducted during 1996 and 1997, but were resumed in 1998 and continue to present day. From 1992 through 2001, a representative sample of stores in each county was inspected. However, as of 2002, surveillance is conducted on a complete county-by-county basis. Instead of inspecting a few stores in every county, all stores in select counties are inspected. As stated earlier, approximately 20% of the retail facilities are visited each year. A list of the stores in the selected counties that are to be inspected and a list of facilities from the previous year that were found to be in violation and therefore, need to be re-inspected are created. In 2006, 14 counties were entirely inspected, and 3 counties were partially inspected. Figure 1 on the following page shows the counties that were inspected in 2006.

**Figure 1:** Counties in which stores were inspected in 2006.\*



*\*Allegheny, Clearfield, and Adams County were only partially inspected*

The information collected during each survey includes: the county ID number, county name, survey date, last survey date (if known), the retailer ID number, retailer name, contact person, retailer address and telephone number, store type, whether it is a chain store, the chain name (if applicable), the status of the solders found and the inspection type (initial, routine or re-inspection. If leaded solder is found, the status of the solder (B-banned or R-restricted), manufacturer, UPC number, the percent of lead (written as the tin-lead content on the spool), core type, diameter, weight, and quantity are also documented.

Although lead free solder may be located anywhere in the store, restricted and banned solders may not. If the facility sells banned solder or if restricted solder is found in the plumbing section, the intern requests to speak to the manager or owner of the store. The intern then explains the provision of the Lead Ban Act, why the facility is in violation of the Lead Ban Act and what corrective actions need to be taken to return to compliance. An information pack consisting of a copy of the Lead Ban Act (1989-33), a copy of the DEP Fact Sheet, “Pennsylvania Lead Ban”, and a flier for retailers explaining what they can and cannot sell is provided. When restricted solder is located in the plumbing section, the intern requests that the solder be moved to another location (typically electrical, tools or welding). If banned solder is found, the interns requests that the solder and sale tag be removed from the shelves. Retailers are reminded that discarding leaded solder in the trash is prohibited by the Department’s Waste Management regulations, so the banned solder is usually returned to the supplier for store credit. Additional information about the manufacturer and distributor of the banned solder (such as contact

information) is recorded. Any retailer or distributor in violation of the Lead Ban Act will receive a written Notice of Violation reminding them that it is a violation of the Act to sell banned solder in Pennsylvania within one or two weeks of the survey.

Data collected during each survey is stored in a database. The Lead Ban database is updated and maintained on a regular basis throughout the summer to ensure an accurate list of store contact information and the types of solder they sell. During the 2004 summer, the database was slightly reorganized and altered to be more presentable and easier to work with. However, it became apparent in 2005 that the database needed extensive revisions due to numerous software upgrades and conversions over the past years. Instead of revising the current database, a new database was created, which incorporated the data from all previous versions of the existing database. Deleting duplicate entries, linking “lost” re-inspections to inspections, and linking the solders sold to specific survey visits were necessary to clean up the retailer survey histories. This new database will make office time for the Lead Ban Intern much more efficient and allow people outside the Lead Ban Project to access data more easily.

## **Retail Hardware Store Survey Results**

This summer a total of 290 stores supplying hardware were inspected in 17 different counties. (Table 3 provides a summary of the inspection results by county.) Of the 290 stores inspected, 181 sold solder. A majority of the remaining 109 stores went out of business, while several were active but did not sell any solder. All 181 of the stores carrying solder had lead free solder, 89 of which sold only lead free solder. Twenty-one (21) of the 181 stores (12%) selling solder were in violation of the Pennsylvania Lead Ban Act in 2006. Restricted solder was found in the plumbing section of 14 stores or 8% of the total stores selling solder. Banned solder was found in 9 stores or 5% of the total stores selling solder. One store had violations for selling both banned solder and leaded solder in the plumbing section. This store was counted in both of the above totals. A summary of inspection results for 2006 is provided on Table 3 on the next page.

**Table 3:** Summary of 2006 inspection results.

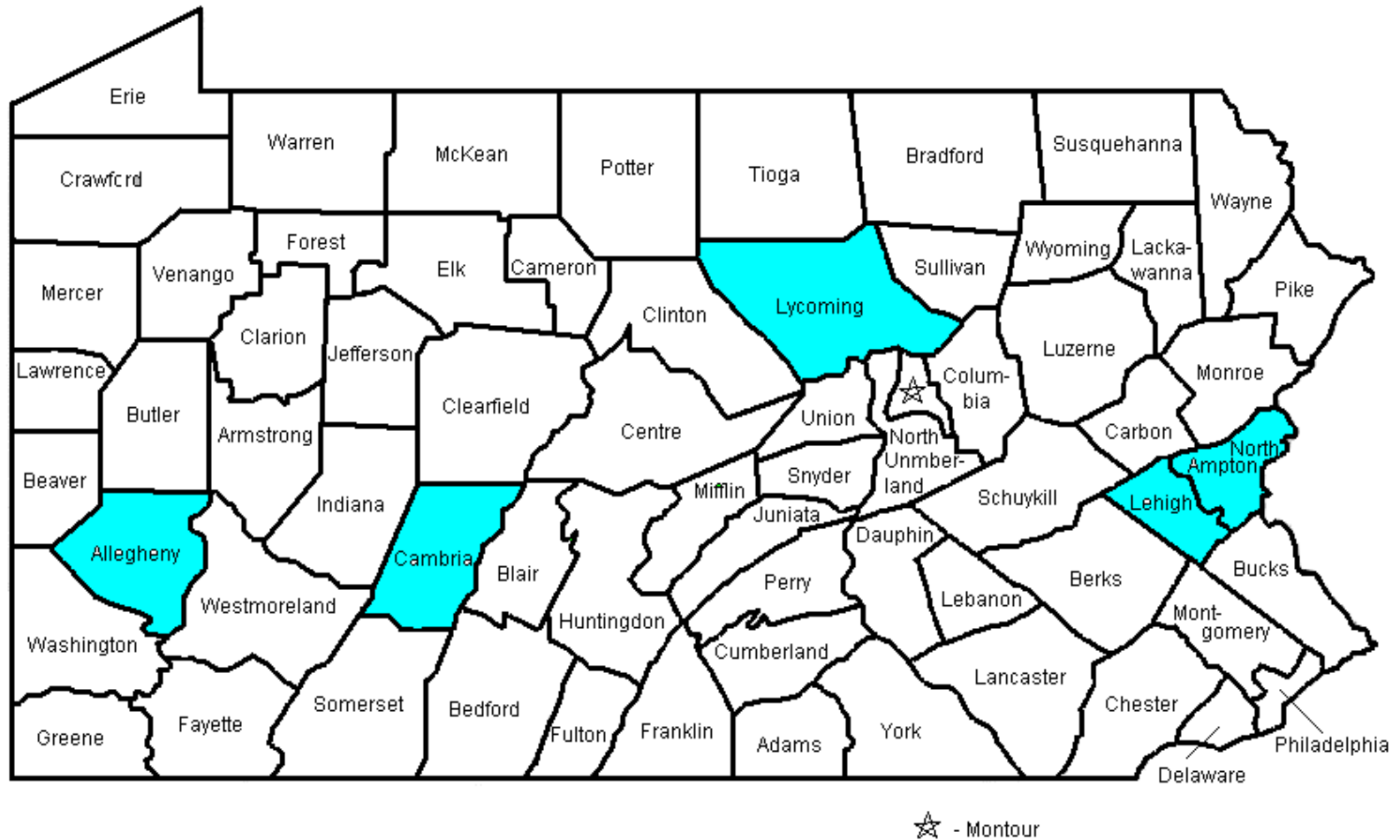
County Identification Number	County Name	Total Stores Selling Solder Inspected	Non-Compliant Stores	Banned Solder	Restricted Solder In Plumbing	Restricted Correct Location	Lead Free Solder	Only Lead Free Solder
01	Adams*	5	0	0	0	4	5	1
02	Allegheny*	19	1	1	0	5	19	14
04	Beaver	13	0	0	0	6	13	7
08	Bradford	10	0	0	0	6	10	5
11	Cambria	12	1	1	1	6	12	3
14	Centre	13	0	0	2	4	13	7
17	Clearfield*	1	1	0	0	1	1	0
19	Columbia	9	2	0	2	3	9	4
20	Crawford	15	1	0	1	4	15	10
22	Dauphin	17	1	0	1	7	17	9
25	Erie	12	1	0	1	3	12	8
30	Greene	5	1	0	1	1	5	3
39	Lehigh	9	1	1	0	6	9	3
41	Lycoming	16	6	3	3	3	16	9
48	Northampton	12	3	3	0	10	12	2
49	Northumberland	10	2	0	2	4	10	4
57	Sullivan	3	0	0	0	2	3	1
Totals**		181	21	9	14	74	181	89
% of stores		100%	12%	5%	8%	41%	100%	49%

\*County only partially inspected.

\*\*Totals and percentages exclude stores not selling solder and stores found to be out of business.



**Figure 2:** Counties where banned solder was sold in 2006.



It is difficult to determine a trend for data prior to 2001, because the method of surveying the stores was changed after the 2001 internship. As previously noted, since 2002, stores are surveyed county by county, instead of inspecting a few representative stores in each county, as was the procedure in the past.

**Table 6:** Comparison of stores selling banned solder over the years. Note: years in bold font mark the change in surveying methods.

Year	1995	1998	1999	2000	2001	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
Number of Stores Selling Solder	130	99	168	186	187	245	260	194	114	181
Percent of Stores Selling Banned Solder	17%	8%	13%	12%	4%	19%	13%	10%	16%	5%

## Other Retail Survey Results

In 1999, the Department discovered that stained glass stores were another area that should be included in the Surveillance Program. In 2002, it was brought to the attention of the surveillance program that other retail establishments (i.e. auto parts stores) were selling banned and restricted solders. In 2004, it was found that electronics stores, such as RadioShack, also carry solder and could be included in the program. These types of stores carry solder for use in vehicle maintenance, electronic repair and the creation of stained glass decor. Any stores where materials used for plumbing systems are sold are covered under the scope of the Act and therefore, should be made aware of the provisions of the Act. The presence of lead free and restricted solders is acceptable because these stores do not have plumbing sections. However, the availability of banned solder is a violation of the Lead Ban Act. Section 4, “Prohibition of Sale of Plumbing Materials That Are Not Lead Free,” of the Act states:

“No person shall sell, exchange or offer for sale within the Commonwealth and pipe, pipe fitting, solder or flux commonly used in plumbing systems that is not lead free. Solders that are not lead free and that are commonly used in plumbing systems include, but are not limited to, solid core or acid core solders, such as 50/50 tin-lead solder and 85/15 tin-lead solder.”

At the time that the Act was written, 50/50 and 85/15 solid and acid core solders were commonly used in plumbing systems and were therefore, banned for sale in Pennsylvania so no one could be able to unintentionally use it in a plumbing system. This is the basis for surveying the other stores.

Initial inspections of these ‘other’ stores - auto parts, stained glass and electronics stores were conducted in 2004 and 2005 to determine what solders are available (specifically whether banned solder is sold) and whether the program needs to be expanded to include these retail facilities as part of routine surveillance. Only a small percentage of these facilities have been surveyed. Of the stores inspected, numerous spools of banned solder have been found, so these facilities should continue to be sought out and inspected. Therefore, the program will be expanded to include auto parts, electronics and craft stores as part of routine surveillance activities. It is the goal of the program that approximately 5% of the total number of routine inspections each year is conducted at these “other” retail establishments.

Nine auto parts stores that were visited in 2005 are now detailed in this report, as they were not included in the 2005 report. Including those stores, eighteen inspections in 5 counties showed that of the

“other” stores selling solder, three (16%) had banned solder, as shown in Table 4. Due to some confusion early in the summer over whether or not these facilities would officially be included in the inspections, few inspections were done. The seemingly low number of non-compliant stores from this summer may not be an accurate display of how many “other” stores are not in compliance. By regularly surveying these kinds of stores, DEP will be better able to prevent the use of banned solders in plumbing.

**Table 4:** Summary of the 2005 preliminary survey results on ‘other’ stores.\*

<b>County Identification Number</b>	<b>County Name</b>	<b>Total Stores Inspected</b>	<b>Stores Selling Solder</b>	<b>Non-Compliant Stores</b>
09	Bucks	9	9	2
13	Carbon	4	4	0
45	Monroe	2	1	0
55	Snyder	1	1	1
46	Montgomery	2	2	0
<b>Total</b>				
		18	17	3
<b>Percentage</b>				
		100%	94%	16%

\* Note 9 auto parts stores previously left out in 2005 report are now added in Table 4.

## **Reasons for Violation**

One reason for non-compliance is the lack of awareness of the Lead Ban Act. Education is key in preventing the sale of banned solder in Pennsylvania and keeping leaded solder out of the plumbing section. Many of the store managers and owners are under the impression that 50/50 tin-lead acid and solid core solders may be sold as long as it is not in the plumbing section of the store. Others claim that their wholesaler displays the solder themselves in the plumbing section. If the storeowners know the laws, the number of stores in violation should decrease. Owners, managers, wholesalers and distributors for the “other” retail stores (auto parts, stained glass and electronics stores), are either not aware of the Lead Ban Act or believe that they are exempt from the Act because they do not sell “plumbing supplies.”

Another cause for stores to be violation was the distributor. Many of the distributors and manufacturers are located outside of Pennsylvania. Since not all states have the same laws regarding solder and plumbing supplies, some distribution and manufacturing companies are still supplying PA stores with banned solder. The distributors for stores found to be in violation of the Lead Ban Act are also sent a written Notice of Violation reminding them that it is a violation of the Pennsylvania Lead Ban Act to sell 50/50 and 85/15 tin-lead acid or solid core solders and any other leaded acid or solid core solder that is not labeled as to its lead content.

Also, what should not be overlooked by the program in the future is the use of banned solders by independent contractors. The largest demand for banned solder (particularly 50/50) could possibly be private contractors dealing with welding and installation of piping in houses and buildings. Through discussions while in the field in 2006 it became apparent that banned solders can be easier to use than other types of solder, and many independent contractors prefer them and use them often.

In all instances where violations were found, the Lead Ban Act was explained to the manger and/or owner and usually there are no further compliance problems.

## **Conclusions**

In 2006, the percentage of stores in violation of the Lead Ban Act has dropped significantly. For the year, 11.6 % of all active stores inspected were in violation of the Act. In 2005, the percentage of stores in violation was 28%. The percentage of stores selling banned solder is also down, from 16% in 2005 to only 5% in 2006. These are encouraging signs that the Lead Ban Surveillance program is effective in educating retailers and eliminating the sale of banned solder in retail hardware stores.

Although the Lead Ban Surveillance Program may be the main reason for the large percentage drop in violations for 2006, there are other factors that likely have contributed. One is the large number of stores (104) that are either out of business or are not selling solder in 2006, and more new locations of larger building supply corporations such as Lowe’s and The Home Depot. These companies only carry lead free solder, and many of the smaller privately owned hardware stores that carry restricted solders can not compete with these large chain stores. This has caused a higher count of retailer locations in 2006 to be marked out of business. Also, a majority of the initial inspections of new retailers in 2006 were larger corporations (Lowe’s, The Home Depot, and Wal-Mart) that were lead free only.

Of the 9 stores found to be selling banned solder, most managers were unaware of the violation and questioned why their wholesale suppliers would send them merchandise illegal for sale. Managers were instructed to remove the banned product and most expressed intent on contacting the wholesale

company for refunds. Educating the managers and owners about the Lead Ban Act is effective and should eventually keep wholesale suppliers from sending banned solder into Pennsylvania.

Due to the fact that most retailers were unaware of the specifications of the Lead Ban Act, mass mailings to active stores in all Pennsylvania counties is appropriate. If letters were to be mailed during the year and inspections followed that summer, violations are sure to decrease. Information and compliance inspections should also be a priority with the wholesale companies that supply illegal solder to the retail stores. If the wholesale companies are educated, inspected, and held to compliance, the retailers will no longer unknowingly receive illegal products. This may be a jurisdiction problem if the suppliers are located in neighboring states, however they can at least receive mailings or be educated through the Lead Ban program, if not through the retail stores inspected in Pennsylvania that they supply.