

1905 MA State Board of Health Annual Report

MATERIALS USED FOR SERVICE PIPES IN MASSACHUSETTS.

Many instances have been given in previous reports of cases of lead poisoning resulting from the use of water drawn through lead service pipes. The results of investigations show that the principal agent in the action of water upon lead pipe is carbonic acid, which is present in varying quantities in the different waters. Ground waters have been found to contain as a rule a greater quantity of carbonic acid than surface waters, and the greatest number of cases of lead poisoning thus far investigated has occurred in cities and towns supplied with ground waters, notably in Fairhaven, Kingston, Lowell, Milford and Milton. Surface waters, after standing for a considerable time in lead pipes, have often been found to contain quantities of lead in excess of the minimum amount believed to have caused injury to health, which is approximately .05 of a part in 100,000 parts of water; but, as a rule, the quantities found in surface waters have been less than this minimum.

That there is danger, however, in the use of lead service pipes when used with surface waters has been shown by the occurrence of cases of lead poisoning during the past year in the town of Norwood, which is supplied with water from a pond. An examination made in 1898 had shown that the water drawn from service pipes in various parts of the town did not contain excessive quantities of lead; but the results of an examination in January, 1905, showed its presence in quantities much greater than those which had been found in the water seven years before, and much greater than those which have been known to cause lead poisoning. Additional examinations later in the year confirmed the results of the January analyses, showing that lead was being dissolved in large quantities from the lead service pipes in Norwood as the water was drawn in ordinary use; and it was evident that a continuance of this condition would result in very serious injury to the health of those using the water. The matter has been brought to the attention of the authorities of the town of Norwood, and the further use of lead for new service pipes has been discontinued and provision made for removing those now in use.

Notwithstanding the danger from the use of lead pipes for distributing water, many cities and towns continue to use this metal, though pipes of other material, not likely to injure health, have been in use for many years.

In order to learn to what extent lead is used for service pipes as compared with other materials in this State, and the experience in the use of the various kinds of service pipes, information has been collected from the water departments of the cities and towns, the results of which are presented herewith.

Number of Service Pipes of Different Materials in Use in Cities and Towns of Massachusetts.

CITY OR TOWN.	Wrought Iron.	Galvanized Iron.	Cement lined.	Lead.	Lead lined.	Tin lined.	Total.	Material now used for New Services.
Abington, . . .	-	12	1,000	-	-	-	1,012	Cement lined.
Agawam, . . .	-	55	-	-	-	-	55	Galvanized iron.
Amesbury, . . .	1,800	-	-	-	-	-	1,800	Galvanized iron.
Amherst, . . .	25	550	-	25	-	-	600	Galvanized iron.
Andover, . . .	14	-	642	6	316	-	981	Lead lined.
Arlington, . . .	-	-	1,880	-	-	-	1,880	Cement lined.
Ashburnham, . . .	-	3	-	72	-	-	75	Lead and galvanized iron.
Ashfield, . . .	-	17	-	-	-	-	17	Galvanized iron.
Athol, . . .	800	710	-	-	-	-	1,010	Galvanized iron.
Attleborough, . . .	-	664	886	-	-	1	1,651	Cement lined.
Avon, . . .	-	3	361	-	-	-	364	Cement lined.
Ayer, . . .	About half.	About half.	-	1	-	-	471	Galvanized iron.
Barre, . . .	-	-	110	-	-	-	110	Cement lined.
Belmont, . . .	-	75	598	-	-	-	673	Galvanized iron.
Beverly, . . .	-	3,376	2	-	173	-	3,550	Galvanized iron.
Billerica, . . .	-	-	268	-	-	-	268	Cement lined.
Boston, . . .	-	-	-	Nearly all.	-	-	90,560	Lead.
Braintree, . . .	-	About 800.	-	About 600.	-	6	1,400	Lead and tin lined.
Bridgewater and East Bridgewater.	Un-known.	Un-known.	-	Very few.	Very few.	Very few.	870	Galvanized iron.
Brockton, . . .	886	-	5,161	-	17	-	6,097	Cement lined.
Brookfield, . . .	-	82	-	10	-	-	92	Lead.
Brookline, . . .	-	681	3,410	-	-	-	4,091	Cement lined.
Cambridge, . . .	-	14,803	-	-	-	-	14,803	Galvanized iron.
Canton, . . .	25	50	795	-	-	-	870	Cement lined.
Chelsea, . . .	-	-	-	6,357	-	-	6,357	Lead.
Cheshire, . . .	9	150	-	1	-	-	160	Galvanized iron.
Chester, . . .	-	190	-	-	-	-	190	Galvanized iron.
Chicopee, . . .	400	-	-	1,653	-	-	2,053	Lead.
Clinton, . . .	-	-	1,815	-	-	-	1,815	Cement lined.
Cohasset, . . .	-	415	70	5	-	-	490	Galvanized iron.
Colrain, . . .	-	6	-	-	-	-	6	Galvanized iron.

Number of Service Pipes of Different Materials in Use, etc. — Continued.

CITY OR TOWN.	Wrought Iron.	Galvan- ized Iron.	Cement lined.	Lead.	Lead lined.	Tin lined.	Total.	Material now used for New Services.
Concord, . . .	-	-	-	-	-	-	-	Lead.
Cottage City, . . .	-	650	-	2	-	-	650	-
Dalton, . . .	-	700	-	-	-	-	700	Galvanized iron.
Danvers, . . .	-	-	1,771	-	-	-	1,771	Cement lined.
Dedham, . . .	200	100	1,248	80	-	3	1,579	Cement lined.
Deerfield, . . .	-	100	-	-	-	-	100	Galvanized iron.
Dracut, . . .	-	121	-	-	-	-	121	Galvanized iron.
Easthampton, . . .	100	700	-	-	-	-	800	Galvanized iron.
Easton, . . .	200	-	-	-	800	-	500	Lead lined.
Everett, . . .	-	-	-	4,853	-	-	4,853	Lead.
Fairhaven, . . .	-	60	-	-	-	600	660	Tin lined.
Fall River, . . .	-	-	-	7,667	-	-	7,667	Lead.
Falmouth, . . .	-	All.	-	-	-	-	-	Galvanized iron.
Fitchburg, . . .	-	-	4,768	-	-	-	4,768	Cement lined.
Foxborough, . . .	Very few.	Very few.	Nearly all.	-	-	-	528	Cement lined.
Framingham, . . .	-	-	-	-	-	-	1,200	Lead and gal- vanized iron.
Franklin, . . .	200	228	276	8	-	-	710	Cement lined and galvanized iron.
Gardner, . . .	-	-	1,883	-	-	-	1,883	Cement lined.
Gill, . . .	62	-	-	-	-	-	62	Wrought iron.
Gloucester, . . .	100	600	3,170	-	6	-	3,776	Galvanized iron.
Grafton, . . .	331	-	-	4	-	-	335	Wrought iron and galvan- ized iron.
Great Barrington, . . .	-	827	-	-	-	-	827	Galvanized iron.
Greenfield, . . .	Few.	Nearly all.	2	-	-	-	1,735	Galvanized iron.
Groton, . . .	-	203	3	-	-	-	209	Galvanized iron.
Hardwick, . . .	-	-	2	3	-	-	5	Cement lined.
Hatfield, . . .	-	228	-	-	-	-	228	Galvanized iron.
Haverhill, . . .	-	97	-	5,600	1	-	5,698	Lead.
Hingham and Hull, . . .	-	Un- known.	Un- known.	Very few.	1	-	2,200	Galvanized iron.
Hinesdale, . . .	-	190	-	-	-	-	190	Galvanized iron.
Holbrook, . . .	-	1	524	-	-	-	525	Cement lined.
Holden, . . .	-	-	128	-	-	-	128	Cement lined.
Holliston, . . .	85	90	-	25	-	-	150	Galvanized iron.
Holyoke, . . .	-	-	-	-	-	-	3,760	Tin lined.
Hopkinton, . . .	About half.	About half.	-	12	1	-	898	Galvanized iron.
Hudson, . . .	-	-	987	-	-	-	987	Cement lined.
Huntington, . . .	1	153	-	-	-	-	154	Galvanized iron.

Number of Service Pipes of Different Materials in Use, etc. — Continued.

CITY OR TOWNS.	Wrought Iron.	Galvanized Iron.	Cement lined.	Lead.	Lead lined.	Tin lined.	Total.	Material now used for New Services.
Hyde Park, . . .	-	6	2,428	-	-	-	2,454	Cement lined.
Ipawich, . . .	-	5	-	728	-	-	733	Lead.
Kingston, . . .	4	-	-	250	-	150	404	Tin lined.
Lancaster, . . .	-	-	300	64	-	-	364	Cement lined.
Lawrence, . . .	186	1,694	-	About 8,722.	About 902.	About 11.	6,483	Lead and lead lined.
Lee, . . .	-	460	-	-	-	-	460	-
Lenox, . . .	-	217	-	-	-	-	217	Galvanized iron.
Leominster, . . .	12	12	2,376	-	-	-	2,459	Cement lined and cast iron.
Lincoln, . . .	-	-	-	-	-	-	188	Galvanized iron.
Longmeadow, . . .	-	All.	-	-	-	-	-	-
Lowell, . . .	-	-	298	-	-	-	11,287	Tin lined.
Lynn, . . .	-	Very few.	11,647	-	About 1,000.	-	13,247	Lead lined.
Malden, . . .	Very few.	Very few.	-	Nearly all.	-	-	7,337	Lead.
Manchester, . . .	-	15	750	-	-	2	767	Cement lined and galvanized iron.
Mansfield, . . .	-	455	-	5	-	-	745	Galvanized iron.
Marblehead, . . .	-	1,872	-	-	-	-	1,872	Galvanized iron.
Marlborough, . . .	-	50	1,631	400	200	-	2,371	Lead and galvanized iron.
Marshfield, . . .	-	300	-	-	-	-	300	Galvanized iron.
Maynard, . . .	-	About 20.	600	1	100	-	720	Cement lined and galvanized iron.
Medfield, . . .	About half.	About half.	-	1	-	-	100	Galvanized iron.
Medford, . . .	-	-	-	-	-	-	4,216	Lead lined mostly.
Meirose, . . .	Un-known.	Un-known.	Un-known.	About 500.	Un-known.	1	3,221	Lead.
Merrimac, . . .	-	-	204	-	-	-	204	Cement lined.
Methuen, . . .	-	-	1,304	1	-	-	1,305	Cement lined.
Middleborough, . . .	12	-	870	1	1	-	884	Cement lined.
Millford and Hopedale.	100	25	-	1,350	25	200	1,700	-
Millbury, . . .	4	1	91	-	245	-	341	Cement lined.
Mills, . . .	All.	-	-	-	-	-	-	-
Milton, . . .	5	182	61	844	2	9	1,127	Lead; tin lined; galvanized iron; cast iron.
Monson, . . .	8	10	270	-	-	-	288	Cement lined.
Montague (Turner's Falls).	-	490	-	-	-	-	490	Galvanized iron.
Nahant, . . .	-	425	-	-	-	-	425	Galvanized iron.
Nantucket, . . .	-	About 400.	-	About 600.	-	10	1,034	Lead and galvanized iron.
Natick, . . .	-	1,800	15	3	4	3	1,925	Galvanized iron.
Needham, . . .	-	39	727	38	7	-	811	Cement lined and galvanized iron.
New Bedford, . . .	11	-	104	9,824	2	23	10,168	Lead.

Number of Service Pipes of Different Materials in Use, etc. — Continued.

CITY OR TOWN.	Wrought Iron.	Galvanized Iron.	Cement lined.	Lead.	Lead lined.	Tin lined.	Total.	Material now used for New Services.
Newburyport, . . .	-	-	3,177	-	-	-	3,177	Cement lined.
Newton, . . .	1,500	4,475	-	1,500	5	6	7,486	Galvanized iron.
North Adams, . . .	-	3,100	-	-	-	-	3,100	Galvanized iron.
Northampton, . . .	1,500	1,000	500	-	-	-	3,000	Galvanized iron.
North Andover, . . .	13	-	393	1	150	15	578	Lead lined.
North Attleborough, . . .	780	-	-	10	230	-	1,020	Lead lined.
Northborough, . . .	317	25	-	-	-	-	342	Galvanized iron.
Northbridge, . . .	100	303	-	-	-	10	423	Galvanized iron.
North Brookfield, . . .	178	-	245	15	-	22	458	Lead; cement lined; tin lined.
Northfield, . . .	-	43	-	-	-	-	43	Galvanized iron.
Norwood, . . .	-	200	-	1,000	-	34	1,234	Tin lined.
Orange, . . .	-	703	-	-	-	-	703	Galvanized iron.
Palmer, . . .	-	100	1	200	-	-	301	Galvanized iron.
Peabody, . . .	Few.	Nearly all.	-	-	-	-	2,230	Galvanized iron.
Pittsfield, . . .	-	About 4,000.	-	Very few.	-	-	-	Galvanized iron.
Plymouth, . . .	-	50	100	2,000	-	1	2,151	Lead.
Provincetown, . . .	10	203	100	-	-	-	313	Galvanized iron.
Randolph, . . .	-	-	843	2	-	-	845	Cement lined.
Reading, . . .	-	49	410	3	724	-	1,191	Lead lined; galvanized iron; lead; cast iron.
Revere, . . .	-	About 1,000.	About 1,450.	6	150	-	2,610	Lead lined.
Rockland, . . .	-	-	1,899	17	-	1	1,917	Cement lined.
Rockport, . . .	-	450	400	6	25	-	831	Galvanized iron.
Rutland, . . .	-	65	-	-	-	-	65	Galvanized iron.
Schuate, . . .	-	474	-	-	-	-	474	Galvanized iron.
Sharon, . . .	25	23	-	300	-	1	348	Lead.
Sheffield, . . .	-	100	-	-	-	-	100	Galvanized iron.
Shirley, . . .	-	3	113	-	-	-	116	Cement lined.
Somerville, . . .	-	-	7,058	2,000	2,000	1	11,059	Lead and lead lined.
Southbridge, . . .	-	Nearly all.	-	2	2	-	About 800.	Galvanized iron.
South Hadley, . . .	-	25	-	400	-	-	425	Lead.
Springfield, . . .	-	-	-	-	-	-	10,641	Galvanized iron.
Stockbridge, . . .	-	200	-	1	-	-	201	Galvanized iron.
Stoneham, . . .	-	-	About 500.	6	About 800.	25	About 1,400.	Lead lined.
Stoughton, . . .	450	200	-	144	40	-	834	Lead.
Swampscott, . . .	-	1,155	-	-	47	-	1,202	Lead lined.
Taunton, . . .	Very few.	-	About 4,000.	-	-	About 800.	4,837	Tin lined.

Number of Service Pipes of Different Materials in Use, etc. — Concluded.

CITY OR TOWN.	Wrought Iron.	Galvanized Iron.	Cement lined.	Lead.	Lead lined.	Tin lined.	Total.	Material now used for New Services.
Wakefield, . . .	Un. known.	Very few.	About 1,700.	-	About 170.	1	1,878	Lead lined.
Walpole, . . .	-	10	554	10	23	1	600	Cement lined.
Waltham, . . .	210	-	3,350	-	-	1	3,561	Wrought iron; cement lined.
Ware, . . .	-	-	819	-	-	-	819	Cement lined.
Wareham, . . .	60	284	200	1	-	-	535	Cement lined.
Watertown, . . .	-	117	1,650	-	-	-	1,767	Galvanized iron.
Wayland, . . .	200	52	-	-	-	-	252	Galvanized iron.
Webster, . . .	-	839	-	-	-	-	839	Galvanized iron.
Wellesley, . . .	148	18	789	9	1	-	949	Cast iron; galvanized iron; cement lined.
Westborough, . . .	785	-	-	-	-	1	788	Wrought iron.
Westfield, . . .	700	1,770	-	-	-	-	2,470	Galvanized iron.
Weston, . . .	-	191	1	-	-	-	192	Galvanized iron.
Whitman, . . .	50	About 850.	About 250.	Few.	-	-	1,150	Galvanized iron.
Willamsburg, . . .	-	100	-	-	-	-	100	Galvanized iron.
Williamstown, . . .	Few.	Nearly all.	-	-	-	-	225	Galvanized iron.
Winchendon, . . .	533	-	46	-	-	-	579	Cement lined.
Winchester, . . .	-	-	400	-	1,600	-	2,000	Lead lined.
Winthrop, . . .	400	528	862	1	99	-	1,928	Galvanized iron.
Woburn, . . .	-	-	Nearly all.	-	About 200.	-	3,030	Lead lined.
Worcester, . . .	-	-	14,905	-	-	-	14,905	Cement lined and wrought steel.

NOTES.

Abington. — Some trouble has been experienced with the filling up of cement-lined service pipes.
Andover. — A few cement-lined pipes have been changed to lead-lined, owing to the filling up of the former with rust.

Attleborough. — During the years 1900 to 1905, 353 galvanized services were replaced by cement-lined pipes, as the water took up enough of the zinc and iron to make it unfit for many domestic uses.

Beverly. — Galvanized-iron service pipes give much trouble on account of rust.

Braintree. — Many of the galvanized-iron service pipes have become filled with rust.

Brookfield. — A few galvanized-iron service pipes have been replaced by lead on account of rust.

Chicopee. — Wrought-iron pipes have been replaced by lead on account of rust.

Cohasset. — Galvanized-iron services laid in salt marshes have been replaced by lead pipes on account of the action of the salt water on the outside of the iron pipes.

Concord. — Galvanized-iron pipes have given trouble on account of rust.

Easton. — Wrought-iron services have been replaced by lead-lined pipes on account of rust.

Fairhaven. — All lead service pipes were changed to galvanized-iron or tin-lined pipes on account of lead poisoning. The galvanized-iron pipes are not satisfactory, as the water acts on the zinc and iron.

Gardner. — All service pipes of other materials have been replaced by cement-lined pipes.

Hardwick. — Two lead service pipes have been replaced by cement-lined pipes on account of lead poisoning.

Haverhill. — Galvanized-iron pipes have been replaced by lead on account of rust.

Kingston. — Many lead service pipes have been replaced by tin-lined pipes on account of the danger of lead poisoning.

Lawrence. — Plain wrought-iron pipes have given trouble on account of rust, and many have been changed for galvanized-iron or lead pipes.

Lowell. — A few lead or lead-lined services have been taken out on account of lead poisoning. The plain wrought-iron and cement-lined service pipes are occasionally removed on account of rust.

Malden. — Iron service pipes have been largely replaced by lead pipes on account of rust.

Manchester. — Galvanized-iron service pipes give some trouble on account of rust.

Marlborough. — Cement-lined service pipes have given some trouble on account of rust.

Melrose. — Wrought-iron and galvanized-iron service pipes have caused trouble on account of rust, and are being rapidly replaced by lead pipes.

Middleborough. — A few lead services have been replaced by cement-lined pipes on account of danger of lead poisoning.

Milford. — Some lead service pipes have been changed on account of the danger of lead poisoning. A few wrought-iron and tin-lined services have been changed on account of rust.

Nantucket. — Many galvanized-iron service pipes have been replaced by lead on account of rust.

New Bedford. — Cement-lined services pipes are being replaced by lead pipes on account of rust.

Newton. — Plain wrought-iron services are being replaced by lead and galvanized-iron pipes.

North Andover. — Cement-lined services have given trouble on account of rust.

North Attleborough. — Plain wrought-iron services are being replaced by lead-lined pipes.

North Brookfield. — A few plain wrought-iron services have been replaced by lead or tin-lined pipes.

Norwood. — A few services have been changed from lead to tin-lined pipes on account of danger of lead poisoning.

Plymouth. — Plain wrought-iron and cement-lined services are being replaced by lead on account of rust.

Provincetown. — Cement-lined pipes are being replaced by galvanized-iron pipes.

Revere. — Wrought-iron services are being replaced by lead-lined pipes on account of rust.

Sharon. — Plain wrought-iron and galvanized-iron services are being replaced by lead on account of rust.

South Hadley. — A few galvanized-iron services have been replaced by lead pipes on account of rust.

Swampscott. — Galvanized-iron pipes are being replaced by lead-lined.

Wakefield. — Cement-lined pipes are being replaced by lead-lined pipes.

Wareham. — Plain wrought-iron and galvanized-iron pipes have given trouble on account of rust.

Whitman. — Plain wrought-iron and cement-lined services have given trouble on account of rust.

Winchester. — Cement-lined services have been changed to lead-lined on account of rust.

From this table it will be seen that in 3 cities, viz., Chelsea, Everett and Fall River, all of the service pipes are of lead, while the service pipes are chiefly of lead in 23 other cities and towns, as follows: —

Ashburnham.	Lawrence.	Palmer.
Boston.	Malden.	Plymouth.
Chicopee.	Milford.	Reading.
Easton.	Millbury.	Sharon.
Haverhill.	Milton.	South Hadley.
Hopedale.	Nantucket.	Stoneham.
Ipswich.	New Bedford.	Winchester.
Kingston.	Norwood.	

Lead or lead-lined pipes are also used to a very considerable extent in Andover, Braintree, Lynn, Melrose, Newton, North Andover, North Attleborough, Somerville, Stoughton and Wakefield. No lead whatever is used for service pipes in 83 cities and towns.

In 12 cities and towns the service pipes are chiefly of plain wrought iron, while in 53 the service pipes are chiefly of galvanized iron and in 49 they are chiefly of cement-lined wrought iron. Tin-lined iron and tin-lined lead pipe have recently been introduced, but thus far they are in general use for service pipes in only one town, — Fairhaven. Considerable numbers of them, however, are in use in Kingston, Milford and Hopedale, where cases of lead poisoning have been caused by the use of lead service pipes, and they are used to some extent in several other places.

For new services and for renewing service pipes, lead or lead-lined pipes are used almost exclusively in 28 cities and towns, as follows: —

Andover.	Lawrence.	Sharon.
Brookfield.	Lynn.	Somerville.
Chelsea.	Malden.	South Hadley.
Chicopee.	Melrose.	Stoneham.
Concord.	New Bedford.	Stoughton.
Easton.	North Andover.	Swampscott.
Everett.	North Attleborough.	Wakefield.
Fall River.	Plymouth.	Winchester.
Haverhill.	Revere.	Woburn.
Ipswich.		

It is worthy of note that the town of North Andover, at the time of the introduction of its water supply, requested, on Sept. 28, 1898, the opinion of the Board as to the probable effect of the water of the proposed source of supply upon lead or lead-lined pipes; and the Board advised the town to avoid the use of lead in connection with its proposed system of water supply. The use of lead for service pipes when the works were first built was avoided, but in recent years lead-lined pipe has been used.

In addition to the foregoing places, lead or lead-lined pipes are used in part for new services in the following cities and towns: —

Ashburnham.	Marlborough.	North Brookfield.
Braintree.	Milton.	Reading.
Framingham.	Nantucket.	

Cement-lined pipes are used for renewals and for new services in 34 cities and towns, and they are used in part in 9 places. Galvanized iron only is used almost exclusively for new services and renewals in 65 cities and towns, and in part in 12 cities and towns.

From the information furnished by the various water departments, it appears that more or less trouble is invariably experienced in the use of

plain wrought iron from the rusting of the pipes, and it has been necessary to renew many of the services of this material after they have been in use for a few years. The use of galvanized-iron pipes has also been unsatisfactory in many cases, and there are 44 places which report considerable trouble from rusting. The cement-lined pipes have given much less trouble than the galvanized iron, and only 8 places report any serious trouble with pipes of this material. As before stated, only comparatively few tin-lined pipes are in use, and in only 1 case has any trouble from the use of these pipes been reported.