

History of Sewage Disposal



Maine Center for Disease Control and Prevention

*An Office of the
Department of Health and Human Services*

Paul R. LePage, Governor

Mary C. Mayhew, Commissioner

History of Sewage Disposal

Throughout history, people have intuitively known that improper disposal of sewage leads to unhealthy living conditions.

This is an example of the likely first sewage disposal method used by humans.



History of Sewage Disposal

The oldest written account of sewage disposal seems to be from the Old Testament of the Bible, for armed scouts.

"Thou shalt have a place also without the camp, whither thou shalt go forth abroad. And thou shalt have a paddle upon thy weapon; and it shall be, when thou wilt ease thyself abroad, thou shalt dig therewith, and shalt turn back and cover that which cometh from thee."

Deuteronomy 23:12-13

History of Sewage Disposal

Backpackers are probably familiar with the modern equivalent of this system of personal waste disposal, politely referred to as a “cat hole”.

Some things just seem to stand the test of time.



History of Sewage Disposal

Pit privies, also known as out houses and earth closets, have been in use only slightly less long than shallow holes. They have been used for thousands of years, in urban settings such as this English church, as well as rural settings like this ranch in the American Southwest.



History of Sewage Disposal

For millennia, the state of the art in interior fixtures was the humble chamber pot, such as this ancient Greek version.

Chamber pots were typically emptied into community latrines when large numbers of people lived in close proximity, or private ones elsewhere.



History of Sewage Disposal

As time passed and technology grew more advanced, the chamber pot was eventually supplanted by a much more sophisticated device.



History of Sewage Disposal

Eventually, the ancient Romans developed flushed community latrines. Users sat on benches suspended over trenches as waste was flushed away by used public bath water-the first documented large scale reuse of greywater.



History of Sewage Disposal

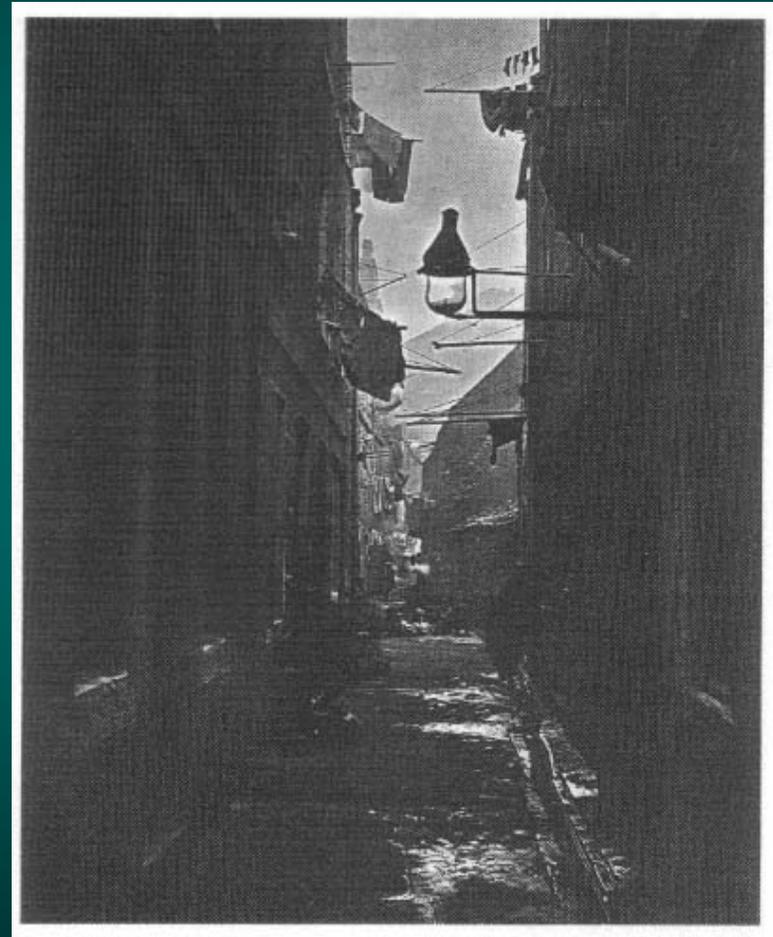
Around AD 100, direct connections of homes to sewers began, and the Romans completed most of the sewer system infrastructure. Sewers were laid throughout the city, serving public and some private latrines. It was mostly the wealthy whose homes were connected to the sewers, through outlets that ran under an extension of the latrine.



History of Sewage Disposal

By the 1800s much of the U.S. and Europe had forgotten the advances made by the Romans and chamber pots were back in vogue.

In large cities like New York, Paris or London- seen here- the street gutters became the preferred point of disposal for chamber pots.



History of Sewage Disposal

There was a thriving cottage industry in European cities for men who would visit wealthy homes daily and empty chamber pots into small barrels. They would then transport the barrels to the nearest latrine or riverbank and empty them there.

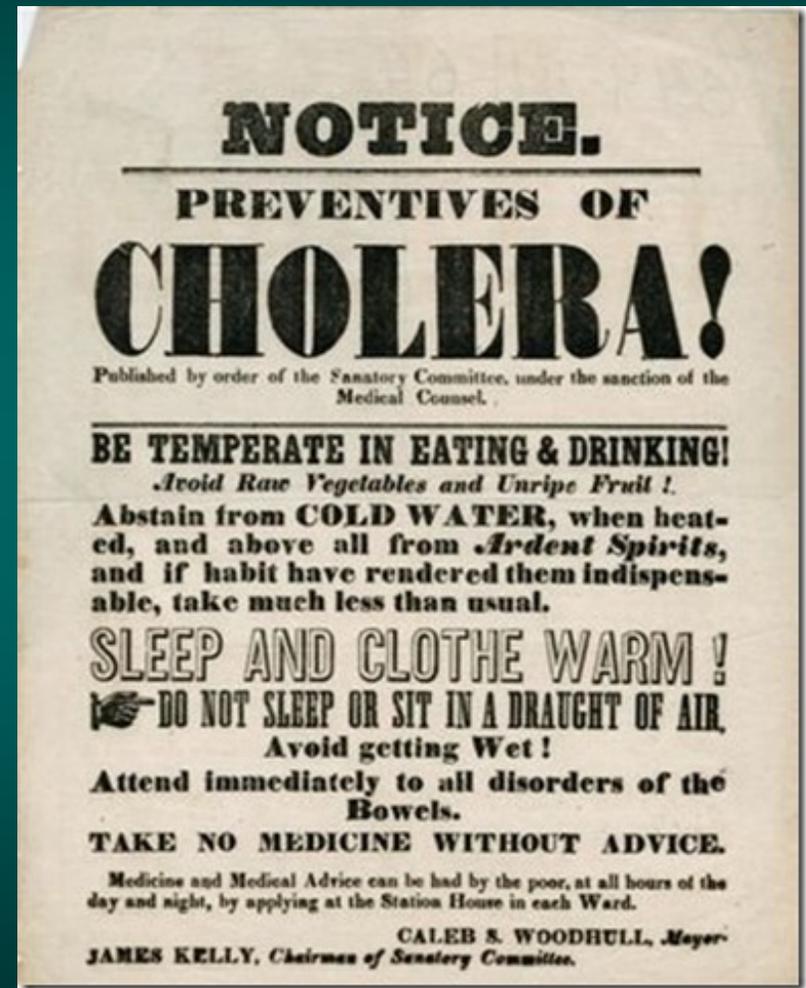


History of Sewage Disposal

Dumping waste in the streets and rivers led to unsanitary conditions and many epidemics.

Cholera and typhoid fever were among the more common and deadly diseases spread by improper waste disposal.

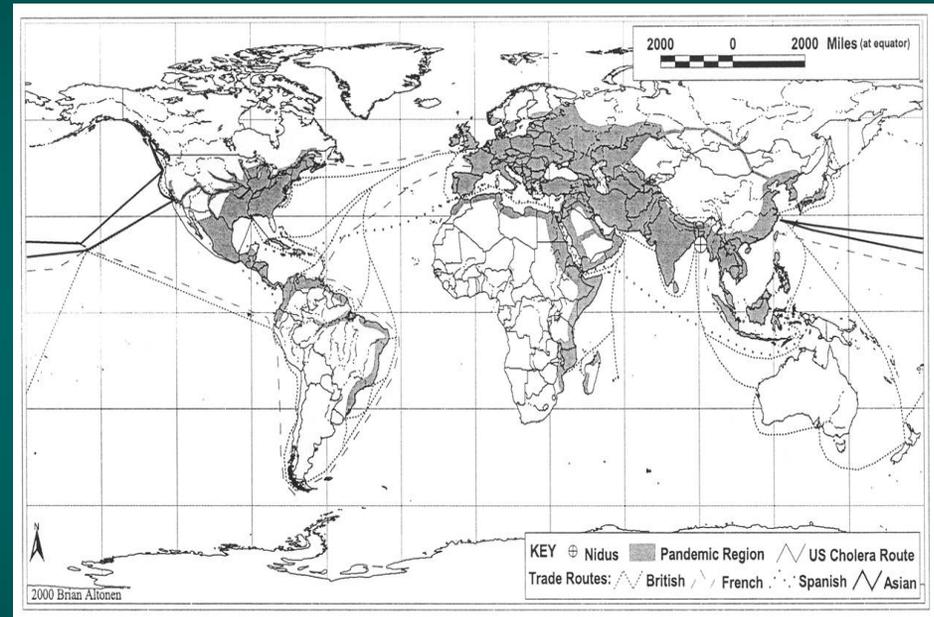
Note that clean water is not mentioned in this poster.



History of Sewage Disposal

We were not immune in Maine. The Second Cholera Pandemic (1829-1849) reached from India to Asia, Europe, Great Britain and the Americas.

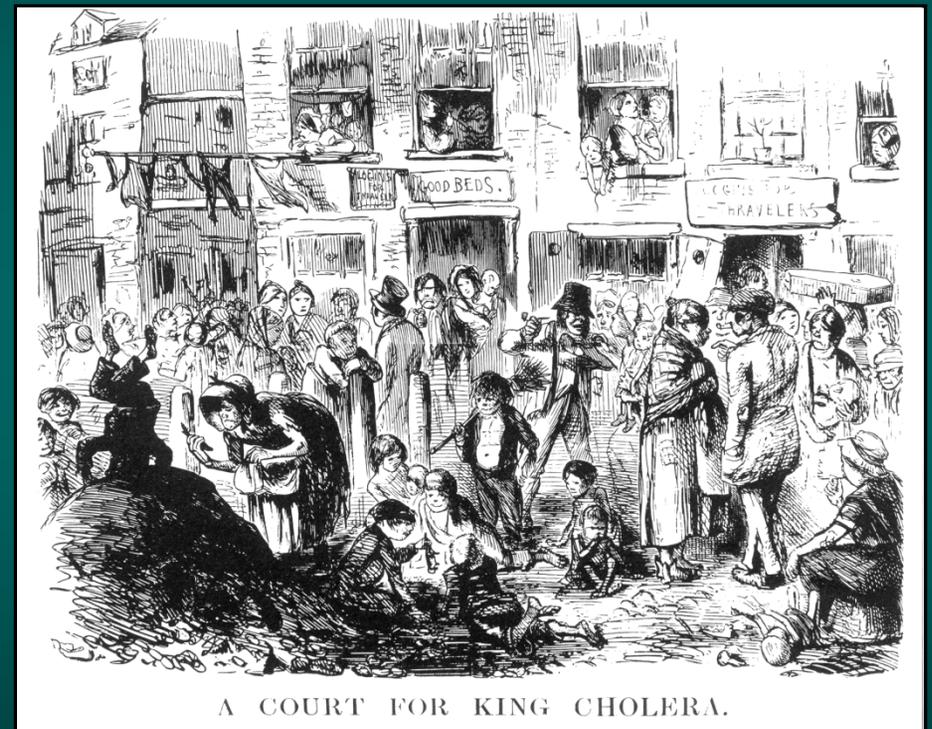
The pandemic finally reached Bangor, Maine killing 20 to 30 within the first week; 112 had died by October of 1849.



History of Sewage Disposal

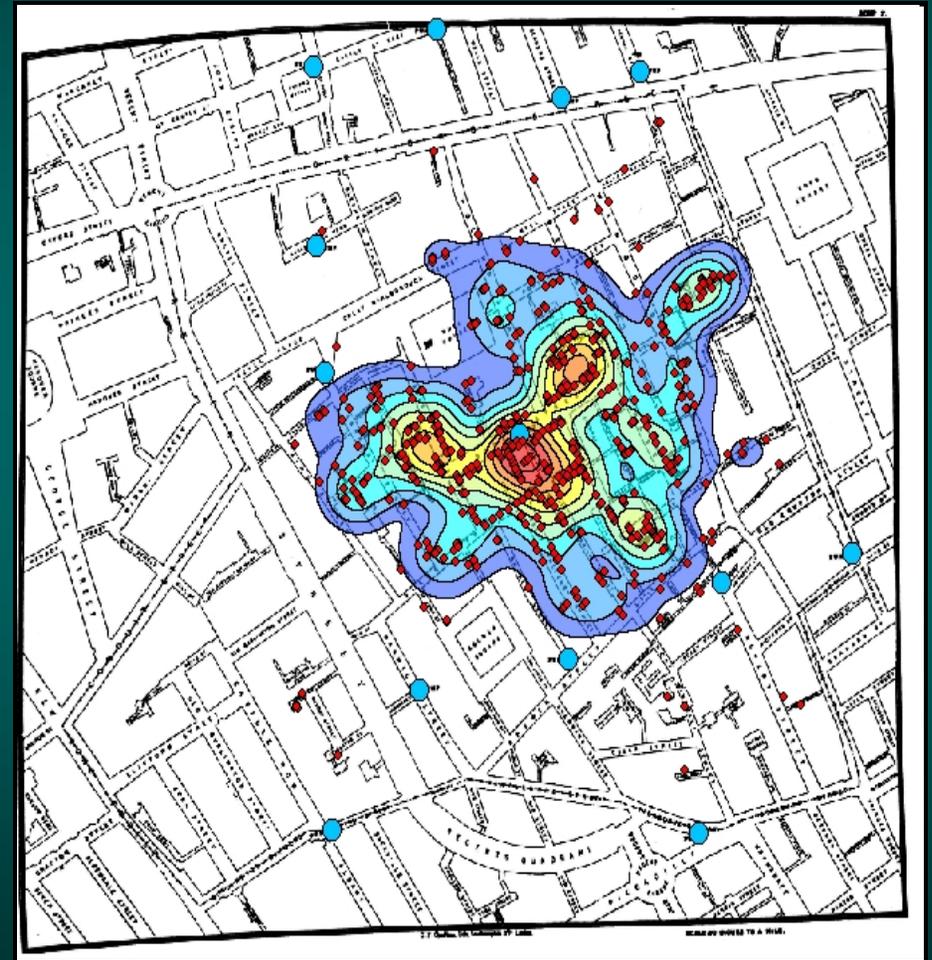
It was estimated that in 1839, for every person who died of old age or violence in London, eight died of disease caused by poor sanitation practices.

London was typical of the big cities of the 1800s in this respect.



History of Sewage Disposal

Notably, the Broad Street outbreak was a severe outbreak of cholera that occurred in London in 1854. This is best known for physician John Snow's discovery that cholera is spread by sewage-contaminated water, which led to the construction of improved sanitation facilities.



History of Sewage Disposal

It wasn't too long after Dr. Snow's discovery that public health agencies began taking sanitation seriously.

For example, sanitary waste was disposed of in Boston's storm sewer system, which discharged the untreated waste into the Charles River (then Boston's water supply) and Boston Harbor.



History of Sewage Disposal

Health issues related to water contamination such as cholera, typhoid fever and dysentery began to increase. In 1875, a study was performed, which led to the construction of the Boston Main Drainage System. This was the precursor to the modern collection and treatment system serving Boston.



Kimball St. Dorchester Overflow 1896

History of Sewage Disposal

It was also about this time that data began to be gathered, such as these water use figures from 1890, from “*Sewage Disposal in the United States*”.

The lowest figure was 36 gallons per capita daily in Atlanta, GA.

The highest figure was 238 gallons per capita daily in Allegheny, PA.

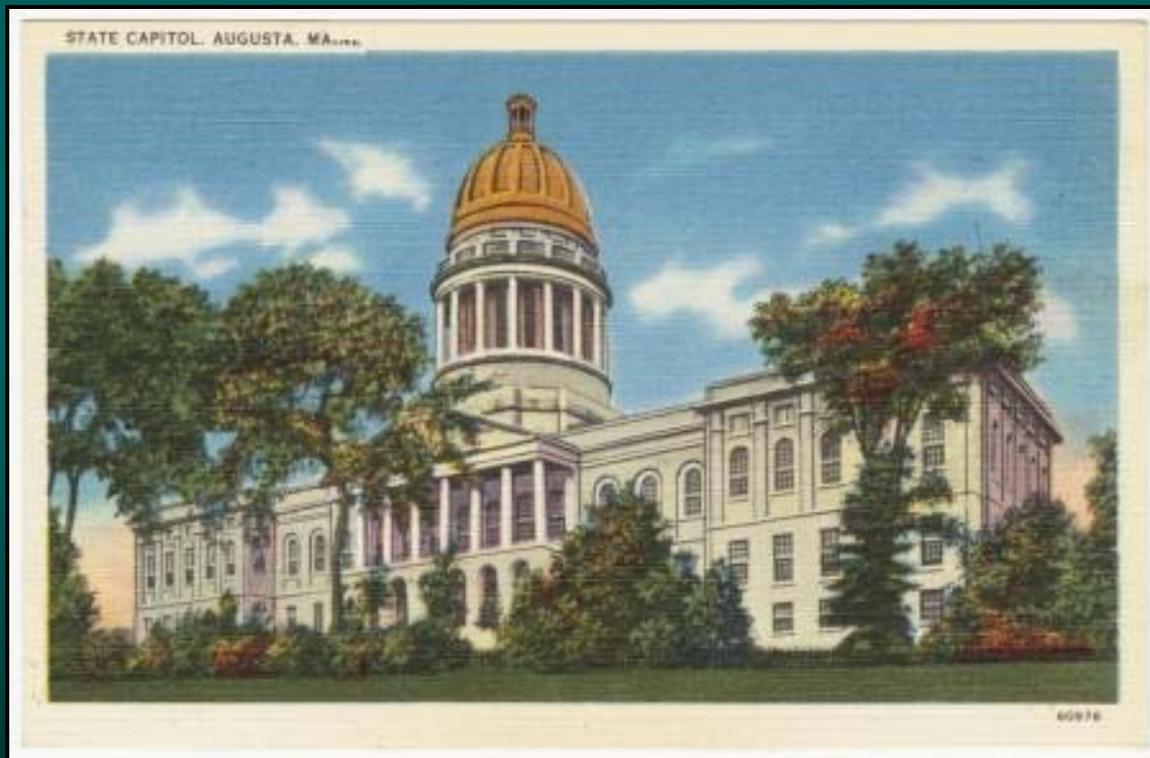
120 SEWAGE DISPOSAL IN THE UNITED STATES.

TABLE NO. 13.—AVERAGE CONSUMPTION OF WATER PER CAPITA IN CITIES OF THE UNITED STATES WITH A POPULATION OF OVER 10,000 IN 1890.*

Rank and name of city.	Population, 1890.†	Daily consumption.		Population per tap.‡
		Total.	Per inhabitant.	
1 New York, N. Y.	1,515,901	121,000,000	79	13.9
2 Chicago, Ill.	1,099,850	152,372,288	140	6.1
3 Philadelphia, Pa.	1,046,164	137,736,708	132	8.7
4 Brooklyn, N. Y.	806,343	55,060,000	72	14.8
5 St. Louis, Mo.	451,770	32,470,000	72	6.6
6 Boston, Mass.	448,477	42,171,100	80	5.8
7 Baltimore, Md.	434,439	40,978,249	94	9.9
8 San Francisco, Cal.	288,997	18,359,000	61	8.7
9 Cincinnati, O.	296,908	33,997,007	112	6.3
10 Cleveland, O.	261,353	27,787,158	103	8.7
11 Buffalo, N. Y.	255,664	47,517,137	186	5.4
12 New Orleans, La.	242,039	8,976,715	37	144
13 Pittsburg, Pa.	238,617	36,000,000	144	8.2
14 Washington, D. C.	230,792	26,888,629	158	6.5
15 Detroit, Mich.	205,876	33,268,067	161	5.1
16 Milwaukee, Wis.	204,468	22,380,783	110	11.1
17 Newark, N. J.	181,830	14,479,793	76	8.6
18 Minneapolis, Minn.	164,738	12,416,117	75	16.5
19 Jersey City, N. J.	163,003	19,200,000	97	11.9
20 Louisville, Ky.	161,129	11,874,688	74	24.0
21 Omaha, Neb.	140,452	14,000,000	94	5.4
22 Rochester, N. Y.	133,896	8,800,000	66	12.7
23 St. Paul, Minn.	133,156	8,000,000	60	15.3
24 Kansas City, Mo.	132,716	12,000,000	71	9.4
25 Providence, R. I.	132,146	6,743,092	48	7.0
26 Denver, Col.	106,713	10,000,000	187	35.6
27 Indianapolis, Ind.	105,496	7,500,000	71	7.0
28 Allegheny, Pa.	105,287	25,000,000	238	11.5
29 Columbus, O.	88,150	6,882,333	78	21.5
30 Syracuse, N. Y.	88,143	6,000,000	68	8.9
31 Worcester, Mass.	84,655	4,971,740	59	18.6
32 Toledo, O.	81,434	5,842,768	72	7.9
33 Richmond, Va.	81,388	12,597,102	107	...
34 New Haven, Conn.	81,268	11,000,000	136	11.8
35 Paterson, N. J.	78,347	10,000,000	128	9.2
36 Lowell, Mass.	77,606	5,127,199	66	14.9
37 Nashville, Tenn.	76,168	11,153,885	146	14.9
38 Fall River, Mass.	74,398	2,136,182	29	6.4
39 Cambridge, Mass.	70,028	4,489,180	64	20.0
40 Atlanta, Ga.	65,533	2,359,564	36	11.9
41 Memphis, Tenn.	64,496	8,000,000	124	5.0
42 Wilmington, Del.	61,431	6,974,912	113	47
43 Dayton, O.	61,220	2,848,526	47	10.5
44 Troy, N. Y.	60,354	7,608,468	125	5.8
45 Reading, Pa.	58,661	5,000,000	75	...

History of Sewage Disposal

The State of Maine becomes involved in sewage disposal and related health issues.



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Maine CDC, Division of
Environmental Health

History of Sewage Disposal

At the beginning of the 20th century, Maine began to document public health issues, including sewage disposal.

Although there was no plumbing code, plumbing related health issues were addressed in the Maine State Board of Health reports to the Governor.

Issues were typically reported in the form of written answers to inquiries made to the State Board of Health, such as:

History of Sewage Disposal

“Question of the Pollution of a Well.

If you can show that a well is polluted by a neighboring privy you may be sure that in the language of section 7, IV, page 3 of "Abstract of the Health Laws," you have "a condition which is detrimental to life and health." It therefore constitutes a nuisance against which local boards of health have authority to act.

If, however, a case of this kind should go to the court it might, without the help of a laboratory, be difficult for the local board of health to prove to the satisfaction of the court that the well was polluted by matter from the privy vault. I would, under our present circumstances advise all local boards of health to act rather cautiously if the owner of the well refuses to abate what the local board of health deems apparently a nuisance.”
(1900-1901 Report)

History of Sewage Disposal

“Sewer and Sewage.

To M. O. N.-The question of the building of a sewer must be left to the judgment of the municipal officers of the city, and I would advise you to confer with the local board of health to see if it may not help in bringing about sufficient influence to lead to the construction of the sewer. But the local board of health has no authority to build public sewers or drains, as you undoubtedly understand.

To H. M. B.-A septic tank properly built and properly managed would, undoubtedly, take care of the sewage from your schoolhouse all right. You would need not only the septic tank, but a little ground on a lower level on which the effluent from the septic tank could be purified by oxidation and nitrification.”

(1909 Report)

History of Sewage Disposal

The oldest copy of the Maine State Plumbing Rules on file at the Division is the 1920 version. This consisted in its entirety of 4 pages.

Notably, Section 1 required that any structure abutting a street with a public sewer had to connect.

RULES AND REGULATIONS.

of the

State Department of Health Of Maine

In relation to Plumbing work done within the state.

SECTION 1.

All houses and other buildings on premises abutting on a street in which there is a public sewer, shall be connected with the sewer by the owner or agent of the premises in the most direct manner possible and, if feasible, with a separate connection for each house or building.

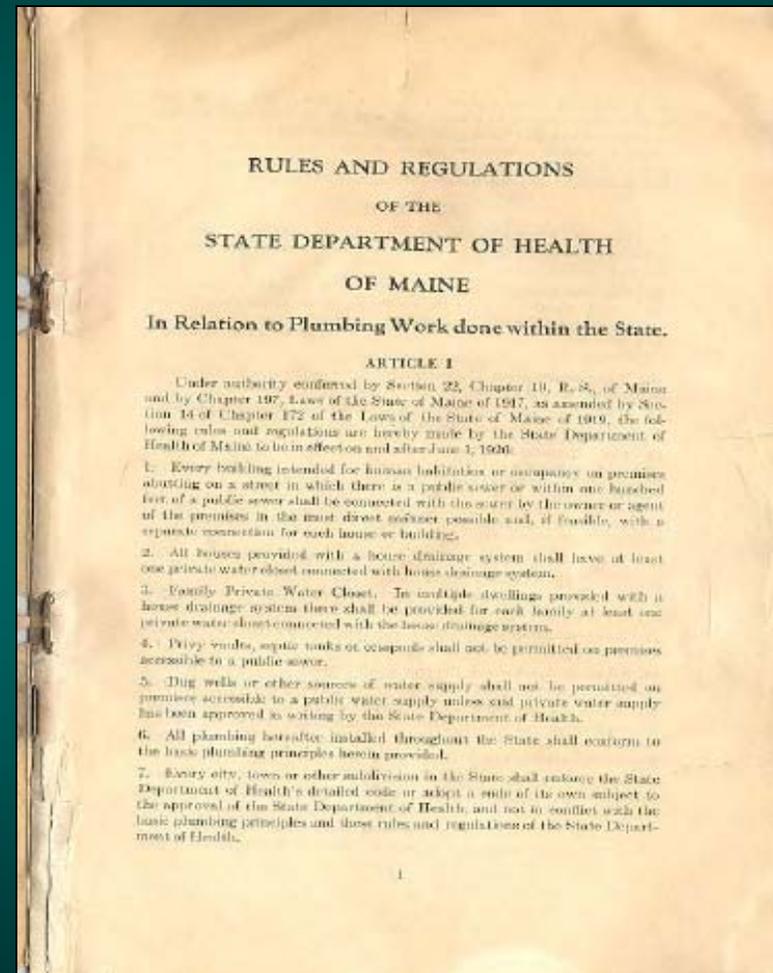
SECTION 2.

The drain from the sewer or cess-pool to the house-drain junction must be of hard salt-glazed, cylindrical earthen-ware, cement or iron pipe free from defects and not less than five inches in diameter. It must be laid upon a smooth bottom and in perfect line, both laterally and vertically, with a fall of at least one-fourth of an inch to the foot, and more if practicable. All joints in earthenware or cement pipes must be uniformly and completely filled with best hydraulic cement, none of which must be forced into the pipe to obstruct its calibre and in iron pipe either calked with lead or have screw joints.

History of Sewage Disposal

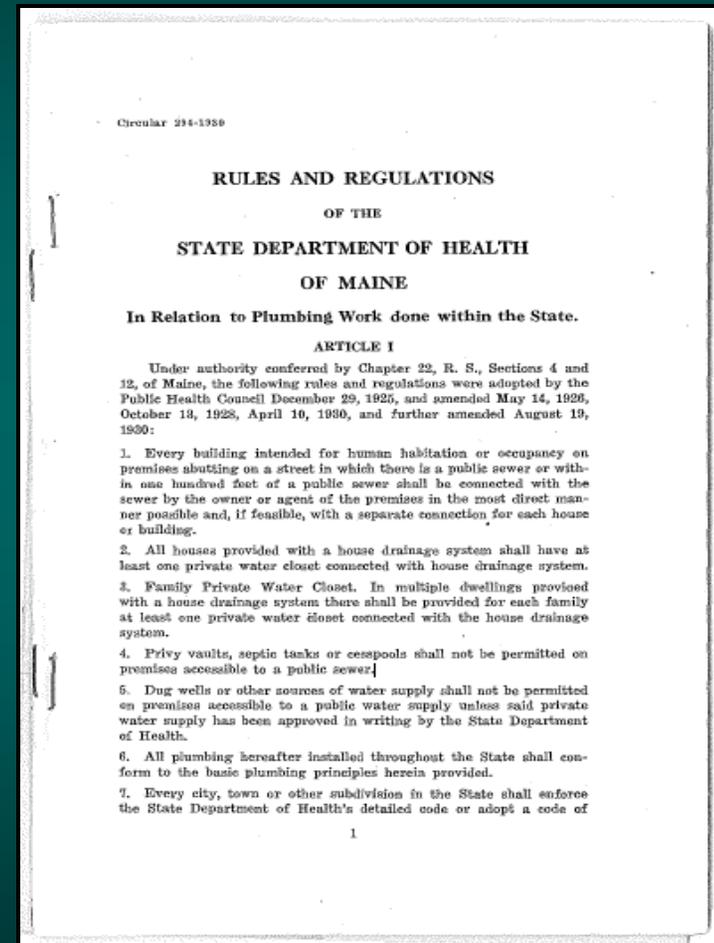
By 1926 the Rules had grown to 20 pages and required connections to cesspools in unsewered areas.

“Section 122. Connections with cesspools. When a sewer is not available, drain pipes from buildings shall be connected with approved private sewage disposal works.”



History of Sewage Disposal

The 1930 Rules added requirements that "all houses provided with a house drainage system shall have at least one private water closet connected with the house drainage system (and that) privy vaults, septic tanks and cesspools shall not be permitted on premises accessible to a public sewer."



History of Sewage Disposal

The 1946 Rules were the first to specify construction materials for tanks, types of approved disposal areas, setbacks from wells and waterbodies, and basic soil criteria.

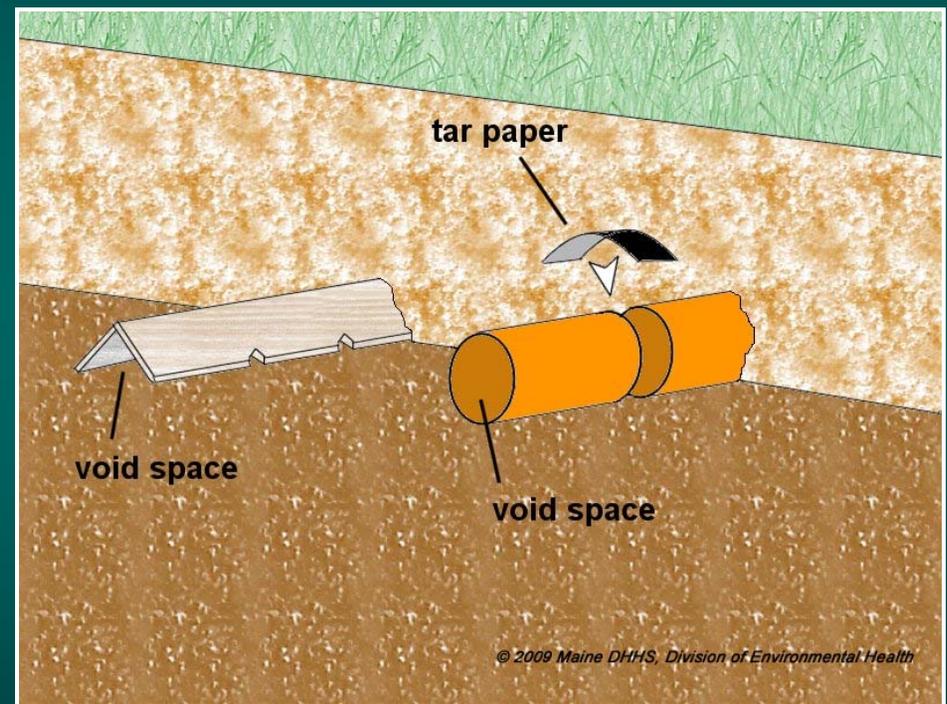
Notably, cesspools and drywells were prohibited from sites with a water table within 4 feet of grade.



History of Sewage Disposal

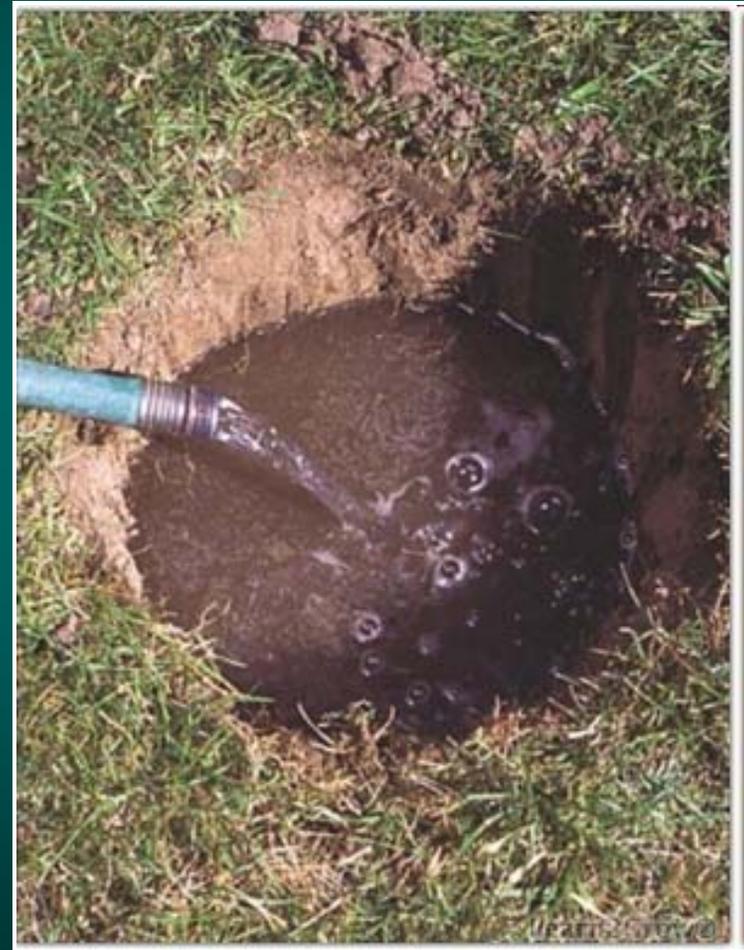
By the late 1940s and early 1950s clay agricultural drainage tiles and vee-notched plank trenches were in common use.

These systems were the forebears of most modern proprietary disposal devices.



History of Sewage Disposal

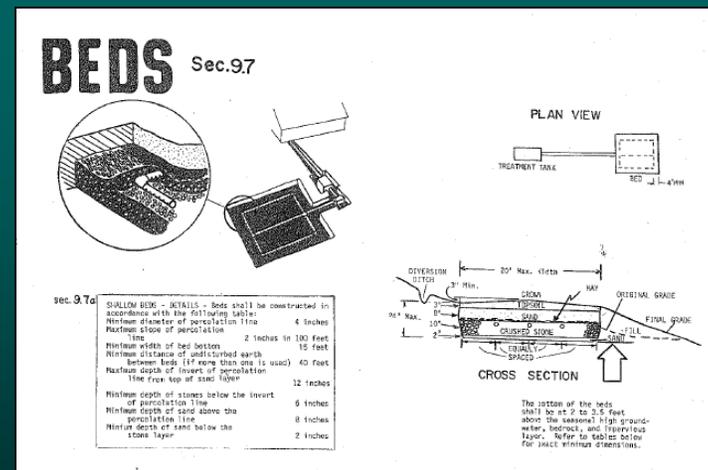
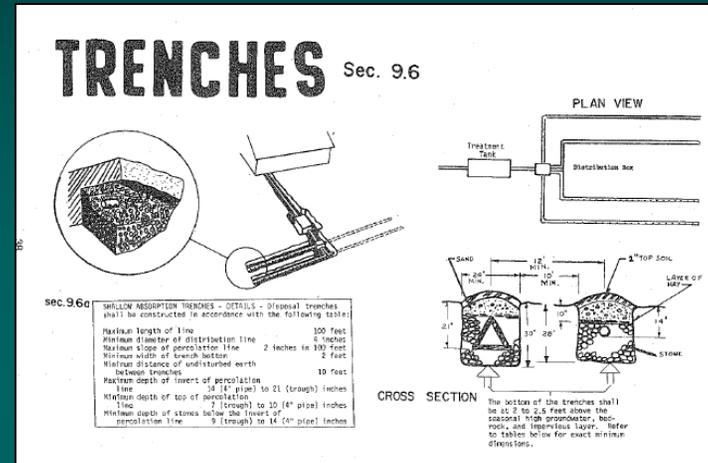
The next major change was in 1970. Percolation tests performed by a master plumber, professional engineer, or registered land surveyor were required. A signed report had to be provided to the Local Plumbing Inspector. This appears to be the first mention of an LPI instead of a local Board of Health.



History of Sewage Disposal

The 1970 Rules allowed only pit privies, stone and pipe beds, and stone and pipe trenches for disposal areas. Cesspools, dry wells and any other disposal device were prohibited by exclusion.

Sizing tables for beds and trenches were provided, based upon percolation rates and occupancy.



History of Sewage Disposal

The Department of Health & Human Services Adopts the Modern Subsurface Wastewater Disposal Rules



Paul R. LePage, Governor

*Department of Health
and Human Services*

*Maine People Living
Safe, Healthy and Productive Lives*

Mary C. Mayhew, Commissioner

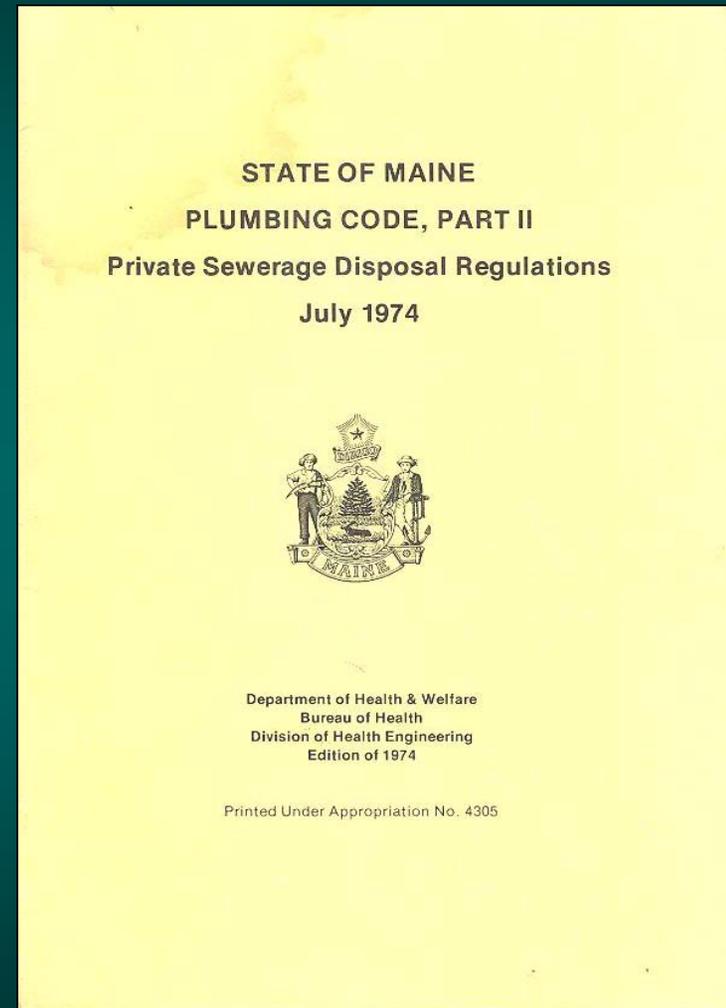
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History of Sewage Disposal

The 1974 Rules were a major change in the way Maine dealt with onsite sewage disposal. The Rules, now separate from the Internal Plumbing Code, changed to a site evaluation process for system design. Land surveyors could no longer design systems, PEs could design systems $\geq 2,000$ gpd, and Site Evaluators could design systems $< 2,000$ gpd.



History of Sewage Disposal

Site evaluation combines soil examination with review of site conditions. Site Evaluators are required to properly identify and accurately report soil textures and limiting factors so they can adequately classify soils, recognize site limitations and properly size disposal systems.



(c) 2009 Maine DHHS, DEH

History of Sewage Disposal

The 1974 Rules allowed chambers, pit privies, leach fields, leach trenches, mounds, and evaporation beds as disposal areas.

By the next major change in 1982, mounds and evaporation beds were no longer allowed.



History of Sewage Disposal

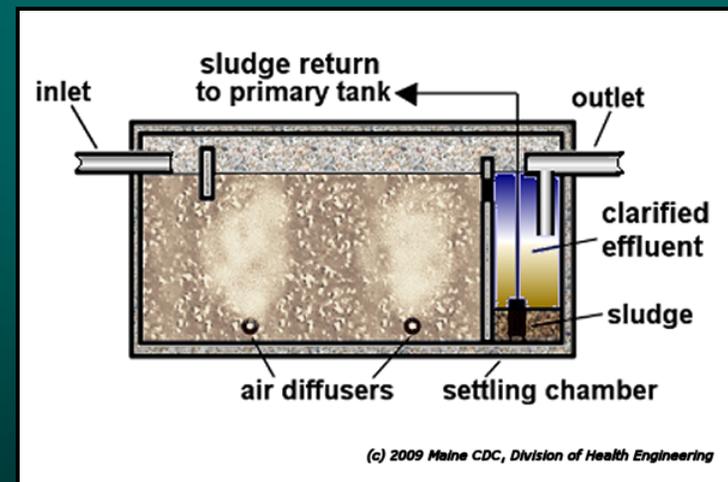
The Rules have been updated as needed to accommodate advances in technology. Allowed disposal areas now include concrete and plastic chambers, cusped blocks, fabric wrapped tubes, and polystyrene aggregate, as well as stone and pipe beds and trenches, and drip irrigation.



History of Sewage Disposal

The Rules also have kept pace with advanced treatment technology.

Most basic are aerated systems (bottom) which apply the same principle of providing oxygen to waste streams for better treatment, as found in most municipal treatment plants (top).

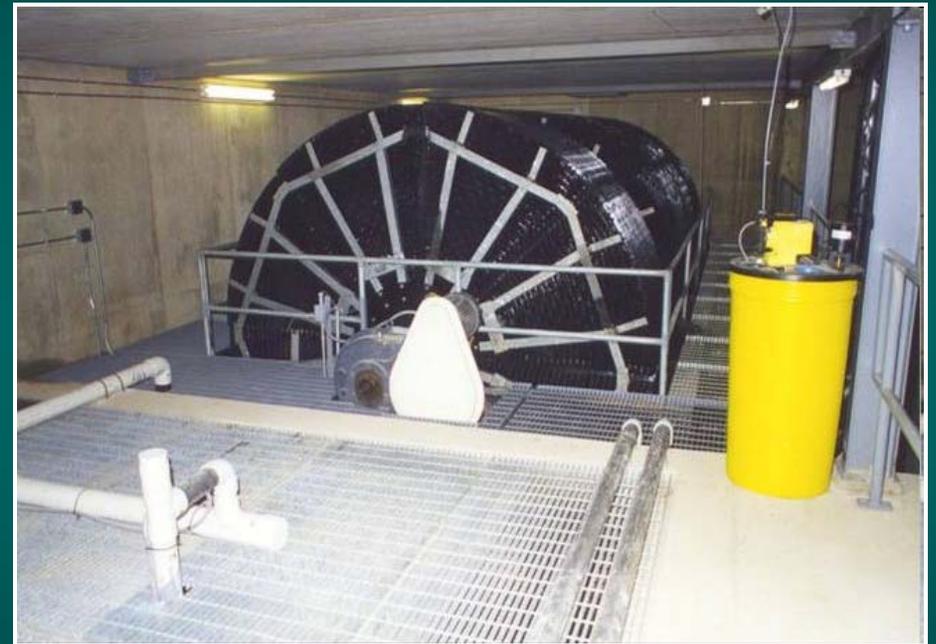


History of Sewage Disposal



Municipal rotating biological contactor

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Huron CMS Rotordisk Onsite System

Maine CDC, Division of Environmental Health

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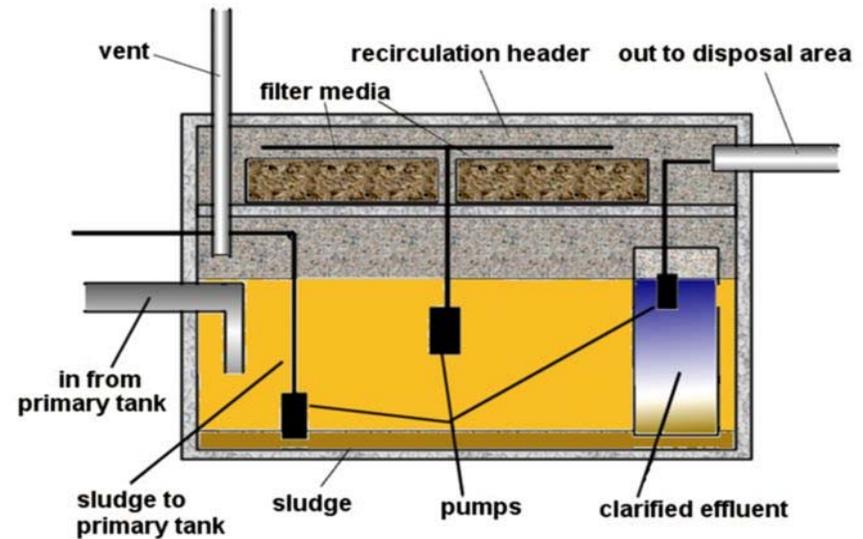
History of Sewage Disposal



Municipal trickling filter system

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Residential trickling filter system

Maine CDC, Division of Environmental Health

History of Sewage Disposal

What are predicted trends in onsite wastewater treatment?

State and regional organizations will play a greater role in the onsite industry.

Technology will be developed to treat sewage to high standards to accommodate increased site demands.

Centralized, multiple user systems will be promoted for areas suffering from historic underperforming individual systems, e.g., neighborhood systems.

Interest in reuse of treated wastewater will increase at both the individual and municipal level.

History of Sewage Disposal

State and regional organizations will play a greater role in the onsite industry.

- MASE and the various Code Enforcement Officer groups will provide real world perspectives.
- Groups such as lake associations and homeowners associations will provide monitoring, training, and oversight.
- Town boards and County commissions will provide planning and related services.

History of Sewage Disposal

Technology will be developed to treat sewage to high standards to accommodate increased site demands.

- Use of aerated treatment systems continues to increase according to anecdotal evidence.
- Tertiary treatment methods, long in use in municipal treatment facilities, have begun to appear in household scale systems.

History of Sewage Disposal

Centralized systems will be promoted for areas suffering from historically underperforming individual systems, e.g., neighborhood systems.

- Elimination of overboard discharge systems will place greater emphasis on creative and collaborative disposal solutions.
- EPA's Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems.

History of Sewage Disposal

Interest in reuse of treated wastewater will increase at both the individual and municipal level.

- As demand for potable water increases, supplies become stressed.
- New sources such as desalinization and reinjection of treated wastewater are gaining traction, especially in the Southwest.
- Onsite reuse includes non-food irrigation (golf courses, flowers, etc.) and non-potable flushing.

History of Sewage Disposal



The End

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History of Sewage Disposal

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History of Sewage Disposal

The screenshot shows a Mozilla Firefox browser window displaying the website for the Maine Subsurface Wastewater Unit. The browser's address bar shows the URL: www.maine.gov/dhhs/mecdc/environmental-health/plumb/index.htm. The website header includes the Maine.gov logo and navigation links for Agencies, Online Services, and Help. The main navigation bar features links for Contact Us, News, Online services, Publications, and Subject index, along with a search box for 'Search Plumbing'. The page title is 'Maine Subsurface Wastewater Unit'. The main content area is titled 'Maine Subsurface Wastewater Unit' and contains the following text:

Maine is a predominantly rural state, and relies heavily on decentralized sewage disposal facilities for disposal of human waste, i.e., septic systems. The State of Maine has regulated septic systems since 1926, to varying degrees. Over the years, the Maine State Plumbing Code, Subsurface Wastewater Disposal Rules (Rules) in their various versions have been administered by the Maine Center for Disease Control and Prevention (MeCDC) and its predecessors.

The MeCDC has been and continues to be responsible for the Rules because they have historically been viewed as a public health code, rather than an environmental regulation.

The Subsurface Wastewater Unit, within the MeCDC's Division of Environmental Health, promulgates and administers the Rules. Our mission is to minimize health and safety hazards associated with improperly installed subsurface waste water disposal systems.

What's New at the Subsurface Wastewater Unit

On this page:

- [Family Burying Grounds](#)
- [Health Inspection Program Holding Tank Policy](#)
- [Fillable Online HHE-200 Page One Available](#)
- [Recently Approved Products](#)
- [Elimination of Permit Labels](#)

The right sidebar contains 'Featured Links' such as [Online Rules](#), [Variances](#), [Site Evaluator Licensing](#), [Frequently Asked Questions](#), [Ten Tips for Systems](#), [Cemeteries and Crematoria](#), [Certifications](#), [Public Swimming Pools](#), and [2001 DHS & DEP Programs Review](#). Below this is the 'Online Services' section with links for [Publications Order Form](#), [Record Search Form](#), and [Water Records](#). The left sidebar lists navigation options: About Us, Forms, Links, Lists, Newsletters, Policies, Publications, and Training. At the bottom, there is a '211 Social Services Help' logo. The Windows taskbar at the bottom shows the Start button, taskbar icons for Microsoft Outlook and the current page, and the system tray with the time 8:21 AM.

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