BRIEF HISTORY

Maine's Subsurface Wastewater Code

Disclaimer

- There will be few specific dates – only general time frames. Most of this presentation was dug out of the mind of an old timer

Background

- Before I start with the history of the code, a little background is in order.

1930s

- Typhoid Outbreaks along the Kennebec River caused the Legislature to create a Division of Sanitary Engineering within the Maine Bureau of Health

- The Division immediately established a lab to test drinking water and river water – for many years it was known as the Public Health Lab. It is now known as the Health and Environmental Testing Lab.

1930 – Early 1990s

- During this time period one should think of the Division as a "Rules and Regulation Incubator."

Why?

- As Maine's Legislature became concerned about issues that they felt were health related they assigned the regulatory and support functions to the Division on Sanitary Engineering.
- In 1974's its name was changed to the Division of Health Engineering.
- It is now the Division of Environmental Health

At some point these issues included:

- The Public Health Lab
- Drinking Water Supervision and Water Plant Operator licensing
- The Water Improvement Commission
- Licensing eating and lodging places, mobile home parks, boys & girls camps,
- Inspecting logging camps, labor housing etc.

- Regulation and licensing x-ray equipment, radio-nuclide licensing, surveillance of Maine Yankee, radon, etc.
- Outdoor and indoor air pollution investigations
- The first State Solid Waste Plan
- Regulating industrial hygiene conditions in industry
- Supervising public water supplies

- Plumbing code.
- Lead paint enforcement – child poisoning
- Certification of Plumbing inspectors/Code Enforcers
- Licensing of Site Evaluators
- Supporting the Boards of licensure of Barbers/Cosmetology, Plumbers, Funeral Services, and Hearing Aids.

In Time

- As the programs grew in size and State and Federal laws changed or were enacted – many of the activities were transferred to other agencies.

What remains Today is

- Eating and Lodging boys & girls camps Licensing
- Subsurface waste water disposal
- Radiation control programs
- Drinking water programs
- Licensing of Site Evaluators

Now Lets Talk About the Code

- Maine's Plumbing Code dates back to the late 1930's.
- After World War II, paragraph 122 was inserted into the Plumbing Code to address septic systems.
- Prior to that, any type of disposal was permitted, the most being cess pools.

In late 50's and early 60s

- The waste water volumes and contaminant load were increasing as automatic washing machines, showers, garbage disposers, etc. came into use

1960's Plumbing Code

- The original paragraph 122 sized systems base on the verbiage *sand, loam, or clay,* which was changed to require percolation tests
- Inverted wooden plank trench systems which were *sized on sand, loam or clay soils*.
- Most of the trench systems ended up being 50 feet long.
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- Septic tanks required for the first time.

Late 60's

- Several additional paragraphs were added to the State Plumbing Code reflect the U.S. Public Health Services "Manual of Septic Tank Practice."
- Additions required percolation tests, known as "Perc" tests, and the number of bedrooms was used to size disposal trenches and septic tanks.
- The only recognized absorption area was disposal trenches

Percolation Test

- One three feet by 12 by 12 inch hole was dug.
- The side walls of the hole were scraped to prevent smearing
- Two inches of gravel was placed in the bottom of it.
- The hole was kept full of water all night.
- The next day adjust the water height was adjusted to 12 inches over the gravel.
- The time it took for the water to drop one inch was measured.

Treatment Area

Perc Rate – Min/inch	Gpd/Sq ft
<0.5	9.5
0.5 – 5	5.0
6 – 15	3.5
16 – 30	2.5
31 – 45	2.0
46 - 60	2.0

Residential Sewage Flows

- Gallons per day based on number of bedrooms and the type of residence.

Bedrooms	Luxury	Medium	Moderate
2	330	225	180
3	450	300	218
4	600	375	256
5	750	450	294
6	900	525	332

Problems Associated with Percs

- Percs did not address ground water problems
- Perc tests were difficult to impossible to perform in the winter or in the spring in soils with high water table
- Most perc tests were performed between July and October.

- The code allowed master plumbers and engineers to perform Perc tests.
- It is estimated the 98+ percent of the perc tests were performed by plumbers.
- The size of the perc hole and the depth of water in hole made a significant difference in the results.
- Federal Housing Administration (FHA) started to insist on percolation tests and that these tests be conducted in the presence of state plumbing inspectors or state engineers.

Perc Test's Background

- It turns out that U.S. Public Service's system of sizing disposal fields using percolation tests was based on a study, by a State Engineer in upper-state NY, of ***20 plus existing systems*** were he attempted to estimate past waste water volume, disposal field sizes, and past performance.

Another Article Reported

- Multiple Perc tests performed at a single site showed that 30 to 40 perc holes were required to be statistically certain the results are within plus or minus 5 minutes per inch.

- A same article found problems associated size of the perc hole and water depths in the perc holeUsing.

The Biggest Problem

- Published U.S. Soil Conversation fact sheets, contained percolation test ranges, indicated that a large percentage of State had soils with percolation rates greater than

60 minutes per inch

Today

- Many States still require versions of a perc test and many times it is required in addition to soil profiling

Clouds on the Horizon

- Several emerging issues forced the Division to revisit the subsurface waste water disposal paragraphs in the Plumbing Code.
- The first was increasing wastewater volumes and changing waste stream composition

- The second -- Increasing wastewater volumes and changing waste stream composition. Some examples were:
  - Automatic washer machines – detergents (PO4)
  - Dish washers
  - Garbage disposal
  - Showers & Jaccuzis
  - Water treatment system backwashes, etc.

- The Third -- Starting in the 60,s many new State and federal environment laws were enacted that were impacted by onsite wastewater disposal. Examples:
  - At the Federal level – The Clean Water Act, EPA
  - At the State level -- DEP, the minimum lot size lot, shore land zoning, etc.

Summary

- 1940 -1950s USPHS basic research in Septic Systems
- 1950-1960s Manual Septic Tank Practice
- 1970s Environmental Movement
- 1980's EPA's On-site Wastewater Management Manual

What to Do?

- In 1972, it was decided that a *new* stand alone Subsurface Waste Water Code code was needed to properly address these emerging issues.

Unfortunately

- There was no Federal guidance other than the "Manual of Septic Tank Practice" which many States were continuing to use as the basis for their onsite wastewater disposal rules

- Even though Maine was experiencing problems with percolation tests, political the safest and easiest thing to have done was to simply adopt the "Manual of Septic Tank Practice" .

Fortunately

- It had a staff experienced in developing new regulations from scratch.
- Was a very small Division in the very large Department of Human Services.
- Had no Board or Commission looking over its shoulder

Where to Start?

- EPA, looking for alternatives to overboard discharges, was funding Universities and others to study methods and the problems associated with on-site waste water disposal.

- Many new subsurface waste water theories were being published. Unfortunately, many were just that “theories.”

- U.S. Conservation Service data sheets – provided permeability ranges reported in minutes per inch.
- Rein Laak at UCON had just completed a very important study of the long term acceptance rates of bio-matts in disposal fields.
- An Ontario study also discussed the bio-matt and possible shadow effect from stones

- A number of studies were showing the impact of pre-treating septic tank waste streams
- The use of disposal beds and concrete leaching chambers were just started being used in other New England States.
- The University of Wisconsin report " On-Site Wastewater Disposal" funded by EPA, provided much needed data on commercial wastewater volumes.

In 1972 it Was Decided

- To replace the Perc test with some type of soil observation – if nothing more than the old *sand, loam, and clay*.

- That the U.S. Soil Conservation Service data sheets were the best place to start.

Why USSCS Maps?

Their data sheets provided info about:

- geologic origin,
- soil texture,
- soil structure,
- permeability rates (Prec rates),
- seasonal water tables, and
- impermeable layers.

Problems

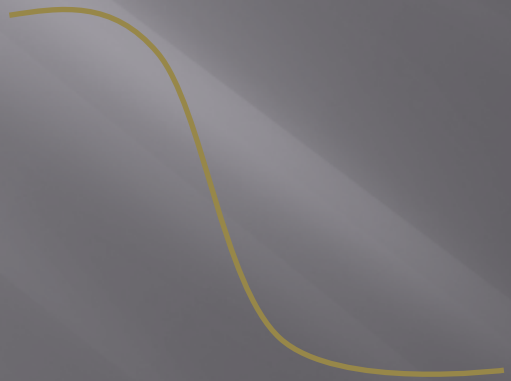
- A single soil texture profile had multiple names and data sheets depending on its position in the landscape – called soil series.

- For the non-soils scientist, this was further complicated by the fact that in a number of soil series had very several similar soil profiles.

Scantic Series

Origin -- Glaciomarine or glaciolaucustrine

Buxton
Lamomine
Scantic
Biddeford



Soil Profile Table

- The UMO's Department of Plant, Soil and Environmental Sciences was contacted.
- Several UMO professors responded and helped condense the 100 plus soil names down into the Soil Profile Table format that exists in today's code.
- It should be noted that for several years the Soil Profile Table actually contained soil names.

UMO's Continued Assistance

- They provided field training for the staff in identifying texture, structure, and mottling.
- Over the years they have continued to provide assistance in modifying the Soil Profile Table's descriptions and acting as experts for the field exams.

Conclusion

- I think it is safe to say that without the U.S. Soil Conservation Service's Maps and Fact Sheets and the help of the UMO's Department of Plant, Soil and Environmental Sciences the code would not have its present format.

Field Sizing Criteria

- Rather than using Prec tests the sizing criteria was based on Laak's bio-matt research, and a lot of trial and error.

- Believe or not -- clean sands were the biggest sizing problem.

Trail and Error

- The early days it was a lot of "Trail and Error" and much of it conducted through variances, all of which were willingly financed by the public requesting the variances.

- In hindsight, I think this code would have been impossible develop if the Division had a Board to report to or was located in a Department whose administration that understood or tracked its activities.

Theories and Areas Explored

- Design flows for large commercial systems – water meters
- North Dakota Mounds
- Plastic and concrete leaching chambers
- Distribution boxes and pressure distribution
- Composting and insinuating toilets
- Back and gray water systems
- Grease traps

- Fill extensions
- Holding tanks
- Aerobic treatment
- Sand, peat, and up-flow filters
- Alternating disposal and resting disposal fields
- Hydrogen Peroxide
- Lagoons
- Problems with dirty aggregate
- Ground water mounding on sites with imperious horizons
- Set back distances
- Nitrogen loading

Site Evaluators

- The initial 1974 version of the code restricted site evaluations to licensed engineers, soil scientists and geologists.
- After several years, the three licensing Boards began battling over who should be allowed to do conduct site evaluations.
- The Legislature decided that Site Evaluators should be licensed by the Division.

- What's why you are setting here today.

Bottom Line

It's still all about the bio-matt, and its long-term acceptance rate

Acknowledgments

- All the credit has to go to the Division staff, UMO Department of Plant, Soil and Environmental Sciences and all the others who have helped to refine the code