



## **The Case for Licensing of Soil Scientists in Pennsylvania**

### **Health, Welfare, and Consumer Protection**

**(A Pennsylvania Association of Professional Soil Scientists White Paper)**

**June, 2011**

The practice of soil science means any service or work which requires education in the physical, chemical, and biological sciences, as well as training and experience in the application of special knowledge of these sciences to the use and management of soils by accepted principles and methods. It involves investigation, evaluation, and consultation in which the successful performance is related to the public welfare by safeguarding life, health, property, and the environment. The practice of soil science includes, but is not limited to, investigating and evaluating the interaction between water, soil, nutrients, plants, and other living organisms. Practical applications include subsurface absorption systems; stormwater infiltration galleries; land application of residuals such as sludge, septage, and other wastes; spray irrigation of wastewater; soil remediation; land application of agricultural products; processing residues, bioremediation, and volatilization; soil erodibility and sedimentation; and identification of hydric soil and redoximorphic features to name a few.

Soil science is the study, use, and practical application of soils as an important agricultural and environmental resource. It is practiced under a wide range of activities that include such tasks as soil characterization, classification, and mapping, and the physical, chemical, hydrologic, mineralogical, biological, and microbiological analysis of soils, and to its assessment, analysis, modeling, testing, evaluation, and use for the benefit of mankind. Professional Soil Scientists protect the health and welfare of Pennsylvania's residents and protect and conserve Pennsylvania's soil and water resources. Professional soil scientists must have a baccalaureate degree including a minimum of 15 credits in soil science from an accredited university, along with 5 years of professional experience in soil morphology, classification, and interpretations. The practice of soil science is recognized by the following states with either a registration or licensing act: Alabama, Mississippi, Tennessee, Arkansas, New Hampshire, Texas, Delaware, North Carolina, Virginia, Indiana, North Dakota, Wisconsin, Maine, South Carolina, Minnesota, and South Dakota, and most recently, Virginia. Yet, in Pennsylvania, there is no statutory or regulatory definition of soil science or soil scientist.

Over 1/3 of Pennsylvania's residents rely on individual on-lot septic systems. Each of these systems relies on the soil for treatment and disposal. When the septic system permitting program was established in the 1960s and 1970s, there was only one type of system that could be approved and it required deep, well-drained soils with a required separation of a 4 foot soil buffer between the bottom of the septic disposal field and either a water table or bedrock limiting zone. The 4 foot soil buffer referenced in the original regulation of 1966) served to mitigate errors in the improper identification of limiting zones. However, over the last ten years new treatment and disposal technologies have been introduced to reduce the four-foot soil buffer down to one foot or less. There is no longer room for error in determining the soil suitability for these new septic systems. Instead of one type of system using septic tanks with stone and pipe distribution, there are well over 100 combinations of treatment and distribution technologies, many of which rely on accurate descriptions of soil properties and the

experience of a trained soil scientist. This is particularly important for large scale or community on-lot sewage disposal systems which may require many acres of disposal area and within which the inherent spatial variability of soils requires proper consideration.

The Pennsylvania Department of Environmental Protection (PADEP) has incorporated into existing regulations the need for "qualified soil scientists" to conduct evaluations for specific types of on-lot septic systems. This action on behalf of PADEP has already acknowledged the special qualifications of soil scientists. Licensing of soil scientists would more fully promote the basic intention of these requirements by applying industry standards, ethics, and continuing education requirements.

Recently, Pennsylvania State Senator Mike Brubaker of the 36<sup>th</sup> legislative district introduced Senate Resolution 140, which proposes a comprehensive review of Act 537 of 1966. Among other goals, the Resolution seeks to

- (1) determine the overall effectiveness of the act, its accompanying regulations, guidance documents and policy statements, in achieving the goals of protecting public health and safety, preventing and eliminating pollution of the waters of this Commonwealth and promoting Intermunicipal cooperation in the planning, implementation and administration of sewage facilities.

We believe that licensing of soil scientists will fulfill an important part of the proper administration of Act 537 as it relates to on-lot sewage disposal.

In addition to on-lot septic systems, over 1/3 of Pennsylvania's residents rely on individual on-site water supply wells. The groundwater for each of these wells ultimately comes from rainwater filtering through soil and underlying rock. Sewage disposal systems, stormwater management structures, solid waste management, biosolids disposal, waste containment structures, and agricultural fertilizer applications all have the potential to pollute water supplies. Each of these potential sources of contamination relies on proper site characterization, beginning with site-specific soil mapping and characterization, in order to minimize or prevent this contamination from occurring.

In Pennsylvania, the PADEP is the primary promulgator of environmental regulations. The PADEP states that their mission is "to protect Pennsylvania's air, land and water from pollution and to provide for the health and safety of its citizens through a cleaner environment." Individual municipalities may also pass ordinances intended to protect the welfare of local residents.

Following are selections from existing ordinances, regulations, and policies written by the PADEP and by local governments to fulfill their shared mission to provide for the health and safety of Pennsylvania's citizens, many of which are unrelated to on-lot sewage disposal and indicate the breadth of soil science applications. Each example

relates directly to the practice of soil science. The examples are intended to illustrate that agencies charged with protecting health and welfare have already recognized the value of professional soil scientists.

- **Municipal Waste Management Title 25 271.122(d)** The soils, geology and groundwater sections of a permit application shall be completed by *experts in the fields of soil science*, soil engineering, geology and groundwater.
- **Municipal Waste Management Title 25 271.915(c)(7)** Sewage sludge may not be applied to agricultural land, forest or a reclamation site that is: Within 11 inches (or 28 centimeters) of the seasonal high water table, nor within 3.3 feet (or 1 meter) of the regional groundwater table. For purposes of this section, the depths to seasonal high water table and to regional groundwater table shall be based on the most recent soil mapping as published by the United States Department of Agriculture (USDA) Natural Resources Conservation Service, or more detailed mapping data as mapped by *an expert in soil science* using standard and acceptable mapping procedures as developed by the USDA Natural Resources Conservation Service.
- **Municipal Waste Landfills Title 25 273.117.** Soil description.  
An application shall contain:
  - The depth to the seasonal high water table within the proposed permit area and adjacent area to demonstrate that seasonal high water table will not contact the liner system.In preparing the soils description and elevations, the applicant shall:
  - Base the description on a sufficient number of pits, excavations and samples to allow an accurate characterization of the soils in the proposed permit area and adjacent area, and each onsite or offsite borrow area.
  - Use the following soil classification systems:
    - For daily, intermediate and final cover, the United States Department of Agriculture Soil Classification System.
    - For the liner system, site construction and other noncover uses, the Unified Soil Classification System.
- **Land Application of Sewage Sludge Title 25 275.312** Site characteristics. No person or municipality may apply sewage sludge to a site unless the site complies with the following:
  - The site has soils that fall within the United States Department of Agriculture textural classes of sandy loam, loam, sandy clay loam, silty clay loam or silt loam, unless otherwise approved by the Department in the permit.
  - The soils have a minimum depth from surface to bedrock of 20 inches.
  - The site has a minimum depth from surface to seasonal high water table of 20 inches. The operator may establish this minimum depth through the use of a tile drain system, if approved by the Department in the permit.

- **Residual Waste Management Title 25 287.122(d)** The soils, geology and groundwater sections of a permit application shall be completed by *experts in the fields of soil science*, soil engineering, geology and groundwater.
- **Land Application of Residual Waste Title 25 291.104(e)** The information required by this section shall be prepared by *experts in soil science*.
- **Erosion and Sediment Control Title 25 102.8(f)** PCSM Plan contents. The PCSM Plan *shall be designed to minimize the threat to human health, safety and the environment* to the greatest extent practicable. PCSM Plans must contain at a minimum the following:
  - The types, depth, slope, locations and *limitations of the soils* and geologic formations.
  - An identification of naturally occurring geologic formations or *soil conditions that may have the potential to cause pollution* after earth disturbance activities are completed and PCSM BMPs are operational and development of a management plan to avoid or minimize potential pollution and its impacts.
- **Erosion and Sediment Control Title 25 102.8(g)** PCSM Plan stormwater analysis. Predevelopment site characterization and assessment of soil and geology including appropriate infiltration and geotechnical studies that identify location and depths of test sites and methods used.
- **PA Stormwater BMP Manual Appendix C. Who Should Conduct Testing** Qualified professionals who can substantiate by qualifications/experience their ability carry out the evaluation should conduct test pit soil evaluations. *A professional, experienced in observing and evaluating soils conditions* is necessary to ascertain conditions that might affect BMP performance, which can not be thoroughly assessed with the testing procedures. These evaluations *must* be conducted by the above professionals in risk areas or areas indicated in the guidance as non-preferred locations for testing or BMP implementation.
- **By PADEP policy, soil scientists:**
  - perform soil profile analysis and hydraulic conductivity testing for all large-volume sewage disposal systems.
  - perform soil profile analysis and hydraulic conductivity testing for PADEP Part II-permitted land application systems.
  - perform soil profile analysis to determine infiltration loading rate for drip irrigation systems.
  - perform soil profile analysis to determine infiltration loading rate and hydraulic linear loading rate for shallow soil onlot systems sited with soil morphology.

- must be employed by a delegated or multi-municipal local agency to provide oversight of soils work performed by local officials, to provide soils training to local officials, and to provide expert testimony at hearings and trials.
- **West Bradford Township, Chester County Ordinance 96-05** The party disputing the boundaries of the Flood Hazard District as established in Section 703 A of this Article shall submit to the Zoning Administrative Officer four (4) copies of a detailed on-site survey of the land in question, made by a professional geologist or *soil scientist*, showing in detail those specifics which the applicant alleges accurately reflect the condition of the land or those changes alleged to have occurred, which remove the land or any portion thereof from the Flood Hazard District as designated in Section 703 A.
- **Kennett Township, Chester County Ordinance 129** Where the Applicant seeks reclassification of hydric soils and their location, such reclassification shall be undertaken by a *Certified Soil Scientist or other similarly qualified professional*.
- **Lower Windsor Township, York County Stormwater Management Ordinance** A detailed soils evaluation of the project site shall be performed to determine the suitability of recharge facilities. The evaluation shall be performed by a *soil scientist or qualified professional*, and at a minimum, address soil permeability, depth to bedrock, susceptibility to sinkhole formation, and subgrade stability.
- **West Donegal Township, Lancaster County Subdivision and Land Development Ordinance 2003**  
Alluvial Soil - Soils formed from material such as gravel, sand, or silt deposited by a stream of water and showing little or no modification of the original materials by the soil forming process. These soils are further identified by the Soil Survey or by an on-site assessment by a *soil scientist*.
- **Doylestown Township, Bucks Co. Ordinance No. 359, March 15, 2011**  
The SHWT [Seasonal High Water Table] and/or permanent groundwater elevation shall be determined for each dwelling unit or building by on-site testing completed prior to the Preliminary Plan submission. The test results shall be certified by a qualified Geologist or *Soil Scientist*.
- **Jackson Township, Cambria Co. Ordinance 62, amended July 29, 1994**  
5. A soils and geologic report indicating the physical characteristics of the site with respect to its suitability for application of sludge...Field tests shall include:
  - (a) Soil borings by a *soil scientist* to confirm actual soil profile characteristics are consistent with published soil survey data.

- **West Deer Township, Allegheny Co. Ordinance No. 376**  
M. If detailed infiltration study is required, the following guidance shall be followed:  
Soil evaluations shall be performed to determine the feasibility and extent to which infiltration systems can be used. The evaluation shall be performed by a qualified, licensed geologist, geotechnical/civil engineer or *soil scientist*...
- **Conewago Township, Adams Co. Subdivision and Land Development Ordinance, January 5, 2010**  
This information shall include a seepage report containing a test pit soils analysis, prepared by a *soil scientist*, and percolation test results in accordance with PA DEP regulations (Chapter 73, Section 15). The bottom of the test pits shall be no less than thirty inches (30”) below the elevation at which the soil/seepage interface is designed (i.e., the bottom of the trench, pit, etc.).  
(13) A liner of impervious material must be provided in all wet ponds. In-lieu-of an impervious liner, the applicant may supply sufficient information to the Township prepared by a *soil scientist*, which includes an analysis of the potential for sinkhole development, and demonstrates to the Township that sinkholes will not develop.
- **East Hanover Township, Dauphin Co. Stormwater Management Ordinance April 1, 2003**  
This information shall include a seepage report containing a test pit soils analysis, prepared by a *soil scientist*...
- **Luzerne Co. Mill Creek Watershed Act 167 Plan June 30, 2000**  
Section 307. Ground Water Recharge  
A. ...A detailed geologic evaluation of the project site shall be performed to determine the suitability of recharge facilities. The evaluation shall be performed by a qualified person (i.e., geologist, geotechnical engineer, and/or *soil scientist*)
- **Frankstown Township, Blair Co. Ordinance No. 100207-B**  
402.6.5 Wetland Study. When a wetland is identified on an inventory conducted by a State or Federal agency or the Township suspects the presence of a wetland, a Wetland Study shall be performed by a professional *soil scientist*...

Who are the people determining depths to seasonal high water tables for municipal landfills? Who are the “experts in soil science” that are providing information for land applications of residual waste? What “qualifications/experience” are presented by those completing site evaluations for stormwater BMPs? What “similarly qualified professional” is permitted to reclassify hydric soils? What is the definition of a professional soil scientist as provided in these regulations? If rules that regulate soil science are established by the State and local governments to provide for the health and

safety of Pennsylvania's citizens, and the Department of State regulates professional practices to protect the health and safety of the public, then it follows that those practicing soil science must be licensed. It is time to recognize and license those that have the knowledge and experience to properly enforce these rules.

Soil science services are frequently sought by engineers, surveyors, and geologists for projects that range from sewage facility planning and soil permeability studies, land application of biosolids, site characterization for planning stormwater facilities and measuring soil infiltration, high-intensity soil surveys (alluvial, colluvial, hydric, and highly erosive soils, seasonal high water tables, prime agricultural soils), expert testimony, locating source materials such as for clay liners, soil nutrient management, pond site evaluations, wetland mitigation, site suitability for landscaping and stabilization plantings, drainage, shrink-swell, clay mineralogy, etc. Licensing of professional soil scientists can be achieved without added taxpayer-supported costs to the state budget by amending the current Engineer, Land Surveyor, and Geologist Registration Law. The vetting of candidates would be handled by the Council of Soil Science Examiners of the Soil Science Society of America. Minimum requirements would be a baccalaureate degree with 15 credits of soil science, five years of experience in soil evaluation and interpretation, and passing two examinations (fundamentals and professional practice). Individuals currently meeting the education and experience requirements would be able to obtain a license during a 1-year grandfathering period. Licensed soil scientists would be subject to continuing education requirements, adherence to a code of ethics, and all other provisions of the current licensing act.

The licensing of professional soil scientists is necessary for the protection of health and welfare, and the proposal for licensure will not infringe on the professional practices of engineers, land surveyors, or geologists. Licensing of soil scientists would not infringe on traditional engineering roles related to soil mechanics such as load-bearing capacity, compressibility, or shear strength determination, but would be limited to the use of soil as a natural body, not as an engineering medium. Likewise, licensed soil scientists apply their knowledge to the surface soils and vadose zone, leaving the study of bedrock lithology and deeper groundwater movement to professional geologists. The licensing of professional soil scientists will not prohibit Sewage Enforcement Officers from fulfilling their permit issuing and enforcement duties as they determine soil "limiting zones" for on-site septic system permits

What licensing of soil scientists will do is protect consumers, as well as engineers, surveyors, geologists, and other design professionals by providing accurate, reliable, and defensible soils information and interpretations based on industry accepted standards. Licensing of soil scientists will allow all of this to be accomplished without any growth in government or increase in cost to the tax payers.