

Licensure of Professional Geologists in New York State

The Geologic Profession

In New York State, thousands of geologists are employed in private business, industry, government, and academia. Specialty areas for geologists include: environmental geology, engineering geology, economic geology, marine geology, geomorphology, geophysics, geology, glacial geology, hydrogeology, hydrology, mineralogy, petroleum geology, petrology, seismology, structural geology, volcanology, and paleontology.

The application of geologic data is an integral part of many actions involving the public health, safety, and welfare of all residents in New York State. Professional geologists determine and apply sound geologic methods that serve to protect the public and the environment. These applications include, but are not limited to, the:

- Exploration, evaluation, development, and protection of private and public water supplies;
- Characterization of the nature and extent of contamination at thousands of sites in New York;
- Remediation of environmentally-impacted sites in New York;
- Location and assessment of the quality and value of New York's mineral and construction resources;
- Exploration and extraction of oil and gas reserves;
- Characterization of impacts to wetlands, surface water, and groundwater resources as well as the design of dewatering or hydrogeologic controls;
- Development and location of critical sites such as power plants, landfills, geothermal heat pumps, and energy storage structures;
- Assessment, as a qualified Environmental Professional (EP), and preparation of Environmental Due Diligence Assessments for Real Property Title Transfers and Brownfield-related studies or property management;
- Certification of aggregate sources that meet specific requirements for use in road and bridge construction;
- Interpretation of subsurface conditions to assess the stability of structures, such as roads, bridges, and building foundations; and
- Examination of areas susceptible to or damaged by landslides, earthquakes, coastal erosion, sinkhole development, or other instabilities

Current Regulatory Framework that Requires Geologic Expertise

A number of areas of Federal and New York State law call for geologic expertise which directly affects the health, safety, and welfare of the public. Here are a few prominent regulations and policies, others are provided in Attachment 1:

Federal Regulations (40CFR, Part 312) for Innocent Landowners, Standards for Conducting All Appropriate Inquiry (AAI) requires a qualified professional to perform a Phase I Environmental Site Assessment. An environmental professional is defined as a professional engineer **or a professional geologist**; additional experience is required for others to be considered qualified.

Susquehanna River Basin Commission (18 CFR 803.43(b)) Policy No. 2002-01, requires specific hydrogeologic analyses as part of a ground water withdrawal application, and recommends that "project sponsors **retain a professional geologist** with substantial experience in the siting, drilling, testing, and permitting of high-capacity water supply wells."

The New York State Department of Health (NYSDOH), as detailed in Public Health Law, Subdivision 206(18) and Section 225 [Appendices 5-B and 5-D and Part 5, Sub-part 5-1], regulates the location, construction, yield testing, and protection of water wells used for drinking, culinary and/or food processing purposes, and public water supply systems. Geologists and/or hydrogeologists are integral in the siting, drilling, aquifer testing, and permitting of water supply wells. For example, well yield testing (5-B.4(b)) requires an experienced hydrogeologist or licensed professional engineer to direct and certify the test. Similarly, the **New York State Department of Environmental Conservation (NYSDEC) has instituted Recommended Pump Test Procedures for Water Supply Applications, Level Two Protocol (developed to address 6 NYCRR 601.5(f)(12))**, which states, "Knowledge of the hydrogeologic conditions...is necessary...to ensure the use of appropriate techniques of analysis. Accordingly, **analysis of pumping test data should be carried out by a hydrogeologist** or other appropriately trained staff."

The NYSDEC approved final regulations implementing legislation to reform the State Superfund Program and create a new Brownfield Cleanup Program (**6 NYCRR Part 375**). These regulations enhance New York State's remedial programs and foster the cleanup and redevelopment of contaminated sites. Much of the work described in the regulations must be performed by a "qualified environmental professional," which includes in its definition the requirement to "hold a current professional engineer's or a professional geologist's license or registration issued by the State or another state..." We believe that such recognition of the profession demands that the State Legislature take appropriate action to do so, rather than facing the unintended consequence of outsourcing its geologic expertise to similarly recognized out-of-state practitioners.

The New York State Department of Transportation (NYSDOT) manual, "Materials Method 29", for preparation of a "Geologic Source Report" states, "...portions of the report shall be **prepared by a qualified geologist**".

The NYSDOH's *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006) recognized the importance of geology in potential exposure of the public to contamination through vapor intrusion (when volatile chemicals migrate from underground and adversely affect indoor air quality). Section 1.5 states that "...[t]he approach to evaluating soil vapor intrusion is dependent upon site-specific conditions. A thorough understanding of the site, including its history of use, characteristics (e.g., **geology**, geography, identified environmental contamination, etc.) and potentially exposed populations, is used to develop an investigation plan."

Recommended Educational Requirements

Currently, Bachelors degree programs in geologic sciences are offered at 35 public and private colleges and universities in New York State (Attachment 2).

Adequate criteria for licensure would include:

- A Bachelors degree in geologic sciences combined with a minimum of 5 years experience; **AND**
- Passage of a qualifying examination.

The above criteria are generally consistent with the minimum requirements established for the 28 states that license geologists. The two largest professional geologic organizations (American Institute of Professional Geologists and the American Association of Petroleum Geologists) have certification standards that require 8 years of documented responsible charge experience beyond a Bachelors degree in lieu of the qualifying examination process.

Core courses in geologic sciences are taught at the undergraduate level. A typical program offers the following courses, in addition to coursework in mathematics, chemistry, biology, and physics:

Physical Geology	Hydrogeology
Historical Geology	Hydrogeochemistry
Rocks & Minerals	Invertebrate Paleontology
Structural Geology	Petroleum Geology
Stratigraphy	Petrology
Field Geology	Petrography
Applied Geophysics	Sedimentary Petrology
Economic Geology	Igneous and Metamorphic Petrology
Environmental/Engineering Problems	Optical Mineralogy
Geomorphology	Sedimentology
Groundwater Hydrology	

Adverse Effects of the Lack of Licensure in New York State

Public agencies and private companies, by law or policy, usually demand licensed professionals in contracting work. As geologists are not currently licensed in New York, they have been historically excluded from direct participation with public works projects. This exclusion has allowed individuals and entities to evaluate geologic conditions with disastrous consequences, placing an undue risk on public health, safety and welfare. Such risks include loss of life and property, higher costs of supervision, costs related to corrective action and lower cost/benefit ratios due to inefficient work. Examples of the impact of the lack of qualified geologic professional input include the following:

Radioactive tritium has contaminated groundwater at the Brookhaven National Laboratory facility on Long Island. Brookhaven National Laboratory is located over a USEPA-designated Sole Source Aquifer. The main issue at this facility

involves radionuclide (Uranium and Thallium), solvent (PCE and TCE), and heavy metal contaminated groundwater (drinking water aquifer) as deep as 300 to 400 feet with a contaminant plume that is located one mile upgradient of a municipal water supply well. Geologists and hydrogeologists are currently in the process of determining whether these contaminants have or will impact the municipal well. Making sure that these groundwater studies and future groundwater remediation efforts are being performed by qualified individuals is crucial to the health and welfare of the residents of Suffolk County.

The sudden and catastrophic collapse of the New York State Thruway Bridge across the Schoharie Creek in 1987 **resulted in ten fatalities**. The collapse was caused by the scouring of sediments from beneath the footings of the bridge (Thornton-Tomasetti, P.C., 1987, Palmer and Turkiyyah, 1999). Foundation design activities apparently did not adequately consider the hydrogeologic ramifications of narrowing the Schoharie Creek flood plain by roughly 80% during construction of that portion of the Thruway. Consequently, the bridge footings were undermined during high flooding, which allowed them to tilt. When the footings moved, the columns supporting the bridge on the footings also canted and structural integrity was lost. It is beyond dispute that the collection and interpretation of sound geologic data prior to construction would have avoided this unfortunate circumstance.

The Retsof Salt Mine in Livingston County collapsed in 1994 and flooded with brine. The ground surface subsided, a large sinkhole developed, the road and bridge on Route 20A were damaged and closed, and private wells lost water. Ultimately, **250 directly-related jobs were lost and for two years, New York State lost more than 50 percent of its production of deicing salt necessary for maintaining highway safety**. Geologists determined that mining had progressed beneath a pressurized pocket of gas and brine and also evaluated the collapse impacts of the regional groundwater resources. Geologists used the results of their investigation to develop a strategy to protect the aquifers from brine contamination and to guide the safe development of the new salt mine. The geologists' role included proving the resource, assessing potential water and gas hazards prior to installing two 1,400 feet deep shafts, and evaluating other potential hazards before a mining permit was reissued. Geologists were also instrumental in improving safety for any new replacement mine.

The Selwyn Theater on 42nd Street in New York City collapsed into an adjacent excavation in 1996. Hundreds of people could have been injured if the collapse occurred just two days later during the New Year's Eve celebration. Geologists evaluated the site conditions during insurance litigation and identified a geologic fault in the adjacent construction site along with unstable bedrock and high hydraulic pressures within the remaining support next to the building. A professional geologist working with the contractor would have quickly recognized these conditions.

In the summer of 1999, two people died and over 600 people were infected after drinking contaminated water at the Washington County Fair. Due to heavy rains, E-coli from cow waste had seeped into a shallow untreated private well that serviced fair vendors. Further assessment revealed that the contamination may have also originated from a septic system serving a nearby building. Had the geologic and hydrogeologic conditions of the area been properly evaluated, water supply wells would have been located elsewhere and the groundwater resources would have been less susceptible to contamination.

U.S. Army Corps of Engineers and the Town of Amherst conducted a one year investigation of **residential foundation damages in Amherst, New York**. Nearly 1,100 foundation repair permits and foundation inquiries have been received by the Town since 1987. Seventy-five percent of the permits and inquiries are located on lowlands with fine-grained glaciolacustrine soils. The town-wide foundation damage rate on these soils is about 3 percent, but in several affected areas the rate is an order of magnitude greater. The cost of some foundation-related repairs exceeded \$100,000, but most homeowners have spent less than \$20,000. The damages generally resulted from lateral pressures and/or differential settlement. If licensed geologists were consulted as part of the development approval process for the Town of Amherst, this type of foundation failure may have been avoided.

Conclusion

It is both sound science and sound public policy to require licensure of professional geologists in New York State. Given the on-going significance of environmental protection, the increased focus on scarcity of natural resources, and the certain geologic movements that accompany the forces of nature, geologists will be increasingly called upon to render professional opinion and expert advice that affect all New Yorkers. Rigorous licensure requirements will weed out those who practice unethically without qualification and provide the public with the assurance of a minimum level of competency and legal accountability.

ATTACHMENT 1

A number of areas of Federal and New York State law call for geologic expertise which directly affects the health, safety, and welfare of the public. Here are some additional Federal and New York State regulations and policies that were not included in the brochure:

Federal Regulations (30 CFR, Part 780) for permitting of surface mines require that cross sections, maps and plans for the mine permit, reclamation plans, and geotechnical investigations be prepared by, or under the direction of, and certified by a qualified registered professional engineer, or **professional geologist**.

Federal Regulations (40 CFR, 264.90) for the Standards for Hazardous Waste Treatment, Storage and Disposal Facilities state that facilities are not subject to regulation if it can be demonstrated that there is no potential for a release, as **certified by a qualified geologist**..

Federal Regulations (40 CFR, 265.90) for the Interim Status Standards for Hazardous Waste Treatment, Storage and Disposal Facilities state that facilities are not subject to ground water monitoring requirements if it can be demonstrated that there is low potential for a release, as **certified by a qualified geologist**.

Federal Regulations (30 CFR, Part 784) for permitting of underground mines require that cross sections, maps and plans for the mine permit, reclamation plans, and geotechnical investigations be prepared by, or under the direction of, and certified by a qualified registered professional engineer, or **professional geologist**.

Federal Regulations (43 CFR, Part 2300) for Land Withdrawals require that a qualified mining engineer, **engineering geologist**, or **geologist** prepare a mineral resource analysis.

The NYSDEC is also finalizing *DER-10 Technical Guidance for Site Investigation and Remediation* of contaminated sites in New York. The document acknowledges the essential importance of proper geologic and hydrogeologic site characterization for contaminated sites, stating that, “Groundwater investigations must be supervised by a **qualified geologist or hydrogeologist**” (Section 3.7.2).

New York State Regulations for Mining and Mined Land Reclamation (**6 NYCRR Parts 420-425**) sets forth requirements for permitting, mining, and reclaiming land in New York. Part 422.1(c) states that the mined land-use plan shall be presented on a map “prepared by an engineer, **geologist**, licensed land surveyor or other person trained in such plan and map preparation.”

ATTACHMENT 2

Undergraduate Geology Programs in NYS:

CUNY:

Brooklyn College
Lehman College

City College
Queens College

Hunter College
York College

SUNY:

Binghamton
Brockport
Buffalo State
University at Buffalo
Cortland
Fredonia
Geneseo
New Paltz
Oneonta
Oswego
Plattsburgh
Potsdam
Stony Brook

Private:

Alfred University
Colgate University
College of St. Rose
Columbia University
Cornell University
Hamilton College
Hartwick College
Hobart William Smith
Hofstra University
Long Island University - C.W. Post Campus
Rensselaer Polytechnic Institute
Skidmore College
St. Lawrence University
Syracuse University
University of Rochester
Union College
Vassar College

Masters and Doctoral Geology Programs in NYS:

CUNY:

Brooklyn College: M.A.

City College: M.A.

Queens College: M.A.

SUNY:

Binghamton: M.A. and Ph.D.
University at Buffalo: M.A., M.S., and Ph. D.
New Paltz: M.A.
Oneonta: M.A.
Stony Brook: M.S. and Ph.D.

Private:

Columbia University: Ph.D.
Cornell: M.S. and Ph.D.
Rensselaer Polytechnic Institute: M.S. and Ph.D.
Syracuse University: M.A., M.S., and Ph.D.
University of Rochester: M.S. and Ph.D.