South Carolina
State Reorganization Commission

THE SUNRISE REVIEW PROCESS

Review of Occupational Registration and Licensing For Hydrologists

State Reorganization Commission
Final Report

October 1993

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PREFACE

House Bill 3008, which would create the South Carolina Board of Registration for Hydrologists, was introduced on January 12, 1993, by Representative Thomas N. Rhoad. The bill was subsequently assigned to the House Agriculture, Natural Resources, and Environmental Affairs Committee. On January 27, 1993, Representative Rhoad requested that the State Reorganization Commission conduct a Sunrise Review on this bill. This report is a summary of written and oral testimony, and research performed by Commission during the course of the Sunrise Review Process.

THE SUNRISE REVIEW PROCESS: AN OVERVIEW

In 1988, the South Carolina General Assembly enacted Act 572, "Review of Occupational Licensing." More commonly known as the "Sunrise Law," this Act addresses the issue of the growing number of occupations seeking state regulation of their professions.

Subcommittees of standing House or Senate Committees, which are referred bills proposing to regulate a profession, have three options under the Sunrise Law. The subcommittee can handle the bill independently, request assistance from the State Reorganization Commission to conduct a public hearing, or request that the State Reorganization Commission be responsible for a public hearing on the bill.

When requested by a subcommittee "to assist," the Commission will provide notices of a hearing to the public and to any public or private organization that may be affected by the proposed bill and assist the subcommittee as required. In addition, the Commission may solicit the participation, on the hearing panel, of state agency personnel who are authorized to regulate a profession similar to the one under review. After conducting its research and receiving the public testimony, the Commission reports its findings and recommendations to the subcommittee.

If a subcommittee requests that the Commission conduct a public hearing, the Commission will be directly responsible for the hearing and subsequent reporting of its findings to the General Assembly. The Commission is to determine if existing remedies adequately protect the public's health, safety, or welfare. This is accomplished through oral and written testimony submitted for the public hearing. In addition, all other evidence collected by the Commission during its evaluation is to be considered.

In determining the need for regulation of the profession, the Commission must evaluate the bill using standards provided by the Act. Further, the Act states that any recommendations for regulation should be the "least restrictive form of regulation consistent with the public interest." Licensure can be recommended by the Commission only when "registration or other means of regulation is not adequate to protect the health, safety, or welfare of the public."

The Commission may choose to recommend one or more means of regulation. Recommendations to the General Assembly may be that: No regulation be created; regulations be assigned to an existing board, agency, or commission; or, a new board be established. If registration or licensure is recommended, the Commission is to recommend what qualifications should be specified for the registration or licensure of the profession and what activities may be engaged in by persons pursuing the occupation.

The State Reorganization Commission will issue a final report to the chairperson of the subcommittee of the House or Senate to which the bill was referred, the President Pro Tempore of the Senate, the Speaker of the House of Representatives, and the

Governor. In addition, the Act requires that the Commission's recommendations be mailed to any person who has made a request concerning occupational regulation that was considered by the Commission. If no changes with respect to regulation of an occupation are recommended, the Commission will notify, by mail, any person who has requested that regulations or changes be recommended.

In conclusion, with the passage of the Sunrise Law, the General Assembly has enacted a method by which the Legislature can review proposals for regulating professions. It now has statutory criteria for evaluating attempts by interest groups to license or register an occupation. At a minimum, the Law requires that proposals:

(1) show the harm that would occur to the public in the absence of regulation, and
(2) demonstrate that licensing is the only way to address the public's need to be protected. The economic impact of state regulation on the consumer also must be addressed.

Sunrise places the "burden of proof" on professions to justify requests for regulation while examining what level of regulation would most benefit the public. Is the public's interest served by restricting the freedom to enter or practice a trade or profession? These questions must be answered before the state willingly infringes on an individual's right to enter an occupation.

EXECUTIVE SUMMARY

This report examines the potential impact of regulation of hydrologists by the State of South Carolina. The nine evaluation criteria contained in the "Sunrise Law" (Act 572 of 1988) are designed to determine the extent to which the public has been or could be harmed as a result of the unregulated practice of hydrologists, and whether the benefits of regulation of the profession by the State outweigh the potential negative effects such intervention may have, such as limiting access to hydrologic services that are affordable and available by engineers and geologists in sufficient quantity and quality.

After analyzing testimony from interested parties, along with staff research gathered throughout the process, the State Reorganization Commission arrived at the following conclusion:

The State Reorganization Commission concluded that the unregulated practice of hydrologists does not pose a danger to the public (Criterion One, page 20).

The Commission conducted research to discover not only specific cases of harm that have resulted from the incompetent practice of hydrology, but also to determine the potential for harm to the public that may result from the unregulated practice. The Commission did not find any documented cases of harm that suggest the profession is in need of regulation. In contrast, the Commission found that the practice of hydrology is already regulated in South Carolina through the licensure of engineers and geologists, who are responsible for hydrological analysis necessary for compliance with State and federal laws. Further, the cases of harm presented by the South Carolina Water Resources Commission could be addressed through strengthening existing laws and regulations, or through assertive administration of existing laws and regulations.

The lack of documented cases of harm, or even complaints against hydrologists or hydrological services can most likely be attributed to the following factors:

The Commission concluded that the general public does not play an active role in the selection of hydrologists and has little direct access to hydrologists in unsupervised, independent practice. Furthermore, if a member of the consuming public was in need of hydrologic services, one would be able to judge the relative merits of services offered by, and select a competent practitioner with, existing resources. Licensed professional engineers and geologists are qualified by their respective licensing boards to perform hydrological services within the fields of practices. Additionally, resources such as the Soil Conservation Service of the United States Department of Agriculture could be contacted (Criterion Two, page 25).

The Commission found that a member of the consuming public would not likely need the services offered by a hydrologist. Instead these services would more reasonably be secured by governmental entities or businesses. However, if a need were to arise, licensed engineers or geologists could be sought for the provision of these services.

Industry and governmental entities, on the other hand, can rely upon national certification programs, recommendations of others, and a thorough evaluation of one's education and experience. Both the Federal and State government have classification systems to establish the necessary qualifications for individuals hired to practice hydrology within a state or federal agency.

The State Reorganization Commission found that existing State and federal laws and regulations adequately safeguard the public from the potential threats posed by the non-regulated practice of hydrologists (Criterion Four, page 39).

Copious and comprehensive federal and State laws exist which are targeted at both conserving and protecting, as well as cleaning up, our Nation's and State's water resources. For example, the Department of Health and Environmental Control serves as the sole advisor to the State in all matters pertaining to the public health and, additionally, is authorized to abate, control, and prevent pollution. Within its mission, the Department is to grant permits for disposal of wastes into the environment and construction of waste treatment facilities; review plans for all proposed public water systems; conduct routine monitoring programs for bacteriological, organic and inorganic chemicals, and radiological contamination; establish necessary standards of water; and, regulate the generation, storage, transportation, treatment, and disposal of hazardous wastes.

The Water Resources Commission is responsible for establishing a coordinated, integrated State water resources policy; promoting plans and programs for the development and enlargement of the State's water resources; and, securing the maximum beneficial use and control of the State's water resources. Within its responsibilities, the Commission administers the Groundwater Use Act, the Interbasin Transfer Permitting Program, and the Drought Response Program.

The Land Resources Conservation Commission's authority which impacts our State's water resources includes the implementation of programs for flood control and determination of nonpoint source pollution controls for agriculture, construction, urban stormwater runoff and mining. Additionally, the Commission is responsible for the South Carolina Mining Act, which includes as its purpose the assurance that the usefulness, productivity, and scenic values of all lands and water receive the greatest degree of protection and restoration.

The South Carolina Coastal Council exercises regulatory authority over eight counties and is empowered to develop and implement a comprehensive coastal management plan.

Additionally, the practice of hydrology is encompassed by the practices of both engineers and geologists who are licensed by the State. The Board of Registration for Professional Engineers and Land Surveyors and the Board of Registration for Geologists are responsible for ensuring that engineers and geologists meet a minimum level of competency prior to licensure, and that a minimum level of competency is maintained.

The State Reorganization Commission further determined:

Given the current circumstances that exist in regard to the practice of hydrology, there appears to be no potential net economic benefit that would occur to the public as a result of regulation of hydrologists, neither in terms of costs of services, nor from the creation of an additional agency of State government (Criteria Six through Nine).

The State Reorganization Commission could not determine conclusively whether regulation of hydrologists would increase or decrease the costs of goods or services. However, licensure could increase the costs of services due to a reduction in the practitioner pool of individuals authorized to practice hydrology or through the implementation of another tier of professionals necessary to complete projects which include hydrological analysis. Additionally, the number of potential licensees as Professional Hydrologists lies between 150 and 300, which is significantly lower than the over 10,500 licensed engineers and geologists in South Carolina. Further, the cost of administering the licensing program could be passed on to the consumer through higher prices charged by practitioners.

In considering the competency of practitioners, the Commission found that the scope of practice for hydrologists is not clearly defined by the proposed legislation, and that regulation of hydrologists would further complicate the overlap which already exists today between engineers and geologists. Another area of concern for the Commission centered around the attainment of the necessary education and experience required by the proposed legislation. No university or college in South Carolina offers a degree in hydrology; and, therefore, potential registrants would in all probability be graduates in engineering or geology curriculums or, at a minimum, receive the necessary hydrology courses through these schools.

Finally, if the General Assembly finds that regulation of hydrologists is necessary, then the Commission recommends the placement of these responsibilities with an existing agency, such as the Board of Registration for Geologists, Board of Registration for Professional Engineers and Land Surveyors, or the Department of Health and Environmental Control.

However, based on the research conducted by the Commission and in accordance with the provisions of Act 572 of 1988, the State Reorganization Commission respectfully recommends that the General Assembly enact no legislation regulating hydrologists at this time (page 57).

SCOPE AND METHODOLOGY OF THE REPORT

This report presents recommendations made by the State Reorganization Commission in conjunction with its review of the need for occupational regulation of hydrologists in South Carolina. Occupations seeking regulation in South Carolina must be reviewed according to criteria established in Act 572 of 1988, "Review of Occupational Registration and Licensing" or the "Sunrise Law." The Sunrise Law contains nine factors which are to be applied when the State Reorganization Commission reviews a request for professional regulation. The criteria are defined in § 1-18-40 of the South Carolina Code of Laws, 1976, as amended:

1. Whether the unregulated practice presents a clear and recognizable danger to the public;
2. Whether the trade or profession is such a specialized skill that the public is not able to select a competent practitioner without some assurance of professional qualifications;
3. Whether the public can be protected by other means;
4. Whether strengthening existing laws would provide adequate protection;
5. Whether third-party payments can only be made to a licensed practitioner;
6. Whether regulation will increase the cost of goods;
7. Whether regulation will increase or decrease the availability of services to the public;
8. Whether regulation will ensure practitioner competency; and,
9. Whether regulation can be provided by an existing agency or by an existing licensed practitioner.

Request for Assistance

On January 27, 1993, the House Agriculture, Natural Resources and Environmental Affairs Committee requested that the State Reorganization Commission conduct a hearing on H. 3008 which would establish the Board of Registration for Hydrologists. The Chairman stated that the Commission's review and recommendation on this bill would be essential to the Committee's deliberations.

Background and Research

State Reorganization Commission staff collected background information from state and national sources, using the nine evaluative criteria outlined in the Sunrise Law as a guide. These sources included the Council of State Government's Clearinghouse for Licensing, Enforcement, and Regulation (CLEAR); the South Carolina Department of Consumer Affairs; the Department of Health and Environmental Control; the Water Resources Commission; the Board of Registration for Professional Engineers and Land Surveyors; the Board of Registration for Geologists; the Board of Registration for Landscape Architects; and, the federal Environmental Protection Agency.

In addition, a number of professional associations and organizations were contacted for information. These groups included: the American Society of Civil Engineers; the Alaska Geological Society; the Arkansas Geological Commission; the American Geophysical Union; the International Association of Hydrological Sciences; the American Water Resources Association; the Plant Physiology Institute, Hydrology Laboratory of the United States Department of Agriculture; the Association of Engineering Geologists; the Western States Water Council; the Office of International Hydrology, Water Resources Divisions, US Geological Survey; the Strom Thurmond Institute of Government and Public Affairs, Clemson University; and water resources institutes of various universities nationwide.

Response to Criteria Solicited from Applicant Group

Staff of the Reorganization Commission worked with the staff of the House Agriculture, Natural Resources, and Environmental Affairs Committee to identify the primary proponent of this legislation. Mr. Rodney Cherry, a private citizen retired from the United States Geological Survey, was identified and provided the State Reorganization Commission with a written response to the nine evaluative criteria.

Public Hearing

Letters were mailed to approximately 145 individuals and organizations notifying them of the Sunrise public hearing on the proposed regulation of hydrologists held on April 29, 1993, and outlining procedures for those wishing to testify. Ten (10) people testified before the Sunrise Subcommittee of the State Reorganization Commission on the proposed regulation of hydrologists. A certified court reporter produced a verbatim transcript of the proceedings.

Preparation of Report

Following analysis of written and oral testimony, along with information gathered during the background research, a draft report containing findings and recommendations was prepared by State Reorganization Commission staff and presented to the Sunrise Subcommittee members for review on September 7, 1993. On that date, the report was approved and issued as a Subcommittee report prior to its consideration by the full State Reorganization Commission. The report was approved in its final form by the full State Reorganization Commission at its October 21, 1993 meeting.

Format of the Report

The research and conclusion developed for each of the nine Sunrise criteria comprise the bulk of the report. Each criterion is presented in the following format:

Statement of Criterion. The criterion is stated as it appears in Act 572 of 1988.

Explanation of Criterion. A brief statement of the standards used in judging the extent to which existing conditions met the criteria, with regard to the occupation under review. Most of the statements are based on professional literature on occupational licensing, such as the Council of State Government's "Questions a Legislator Should Ask," and Benjamin Shimberg's book, *Occupational Licensing: A Public Perspective.*

Commission Research. These sections contain information compiled by the Commission during the course of the background research on the occupation under review. Additionally, this section assesses the impact the legislative proposal would have, in regard to each of the criteria, if enacted. This section also incorporates summaries of relevant written and oral testimony from supporters and opponents of regulation, as received by the Commission.

Proponent's Response. This section represents the verbatim written responses submitted by Mr. Rodney Cherry, a private citizen identified as the primary proponent, in response to the nine Sunrise criteria.

Commission's Conclusion. This section represents the State Reorganization Commission's decision as to whether the criterion has been met in such a way as to pose a net benefit to the public.

BACKGROUND

Legislation to license hydrologists in South Carolina was first introduced in the 1992 legislative session by Representative Thomas N. Rhoad. The bill, House Bill 4507, was introduced and received first reading on March 4, 1992. Subsequently, the bill was assigned to the House Agriculture, Natural Resources, and Environmental Affairs Committee. The bill was not reported out of committee during this session, and since this was the last of a two-year legislative cycle, the bill died in committee.

During the 1993 legislative session, Representative Rhoad reintroduced the bill on January 12, 1993. On January 27, 1993, the House Agriculture, Natural Resources, and Environmental Affairs Committee requested that the State Reorganization Commission conduct a Sunrise Review on House Bill 3008.

During the performance of the Sunrise Review, the Commission learned that the establishment of the Board of Registration for Geologists, in 1986, has resulted in individuals not licensed as professional geologists, being restricted from independently submitting plans/reports, which involve ground water analysis and interpretation, to the Department of Health and Environmental Control (DHEC). Support for the inclusion of ground water within the scope of practice for geology may be found in both the statutes and regulations. For example, the definition for geology found in § 40-77-10 (4) of the South Carolina Code of Laws, 1976, as amended, includes the applied science of utilizing knowledge of the earth and its constituent rocks, minerals, ***liquids***, gases, and other materials for the benefit of mankind. The Board further specifies the inclusion of ground water in its regulations which state that the purpose for the regulation of the fields of geology as it relates to engineering, ***ground water***, mineral exploration and development, geologic hazards is to safeguard life, health, and property, and to promote the public's welfare.

As introduced, the proposed legislation would define a hydrologist as "a person with special knowledge of the science of geology, hydrology, geophysics, and related earth sciences and principles and methods of hydrological analysis acquired by professional education and practical experience." The legislation would create a practice act requiring anyone engaged in the public practice of hydrology to be licensed by the Board of Registration for Hydrologists. As defined, the public practice of hydrology would include the performance of hydrological service or work in the nature of consultation, investigation, surveys, evaluations, planning, mapping, and inspection of hydrologic work required for supporting compliance with municipal, county, state, or federal regulations.

Tasks which could be performed by a hydrologist include, but are not limited to:

- Siting hazardous and municipal landfills including surface and ground water quality and flow characteristics;
- Simulation and analysis of floods and droughts;
- Flood frequency analyses;

- Hydrologic data collections, analysis, and interpretation including surface water levels and flows, ground water levels, and quality of surface and ground water;
- Simulation of ground water levels under different pumping scenarios;
- Bioremediation of hydrocarbon contaminated aquifers;
- Simulation of saltwater movement into freshwater aquifer systems and streams;
- Characterization of aquifer systems and surface water sites for potential water supply;
- Assimilation of point and non-point source pollution by lakes and rivers; and,
- Land use on water quality.

The proponents of this legislation contend that licensed individuals, specifically engineers and geologists, are performing hydrologic functions for which they are not qualified; hence, the need for regulation. In contrast, the opponents contend that the tasks performed by hydrologists are included within the practices of engineering and geology; and therefore, additional State regulation is not needed and would, in fact, create duplication.

The most contested issue observed by the Commission during this review evolved around the degree of overlap between the scope of practices for hydrologists, engineers, and geologists. Currently, in South Carolina, the practices of engineering and geology are regulated, and the scope of practices for these professions include aspects of hydrology. Opponents of this legislation contend that hydrology is in essence a subfield which is encompassed within the practices of geology and engineering. Further, they contend, under existing statutes only licensed professional engineers or geologists may attest to the majority of the above functions. DHEC stated that "plans/reports addressing only hydrology are very rare. Specifically, a surface water hydrological evaluation (for example, determining wastewater loading to a stream) will be part of a wastewater system design where the entire project/plan is certified by a professional engineer. The evaluation of hydrological parameters of the subsurface must consider the ambient geological factors and is, therefore, certified by a professional geologist."

Both proponents and opponents do tend to agree that a multidisciplined approach is necessary in working towards a solution to the environmental problems which may include ground water and subsurface systems. Both parties concur that in order to find solutions to the water contamination problems in South Carolina, and nationwide, it is necessary that all disciplines work together. Written testimony submitted by one opponent states that his firm integrates the skills and perspective of a wide variety of scientists and engineers into their project teams. Members of the team include geologists, hydrogeologists, hydrologists, geophysicists, environmental engineers, geotechnical and geological engineers, soil scientists, environmental chemists, environments statisticians, geographic information specialists, and environmental data management specialists. Additionally, the firm includes other professionals including

toxicologists, biologists, meteorologists, wetland specialists, foresters, regulatory compliance specialists, health and safety professionals, meteorologists, health physicists, remediation specialists, risk assessment specialists, and quality control specialists, as well as all of the traditional engineering subdisciplines required to complete conceptual and detailed design of environmental engineering solutions. He attests that this diversity is absolutely necessary to address all the interdisciplinary issues involved in the process of investigation, assessment, and solution of environmental contamination and restoration challenges. He points out that even within the field of hydrogeology there are at least a dozen distinctive specialized subdisciplines.

EVALUATION CRITERIA

Criterion One

Whether the unregulated practice of an occupation presents a clear and recognizable danger to the health, safety, or welfare of the public.

Explanation of Criteria

Criterion One is the most important of the nine Sunrise criteria, since under the Sunrise Act, a recommendation to regulate a profession is warranted only in those cases where it can be demonstrated that the public has suffered harm that is directly attributable to the lack of regulation, and that the harm occurring is sufficient to warrant State intervention.

Commission's Research

As outlined in the Sunrise Act, the purpose of State laws regulating professions and occupations is to protect the public from harm that could be caused by incompetent practice. Some of the ways in which unregulated professionals may pose a threat to the public are by: (1) lacking proper qualifications; (2) using devices and substances that are dangerous; (3) performing functions that are inherently risky or dangerous; or, (4) performing such tasks in situations requiring a large degree of unsupervised, independent judgement. The State Reorganization Commission evaluated the potential for public harm occurring as a result of the incompetent practice of hydrology. The Commission also searched for evidence of actual instances where South Carolinians have been harmed as a result of the unregulated practice of hydrologists.

- **Unqualified Hydrologists.** Proponents of regulation contend that "the public has been led to believe that credentials in other professions qualify these practitioners to practice in hydrology; when, in fact, there are no provisions within current registrations of other professions, such as engineering or geology, that are specific to the practice of hydrology."

The Commission has determined that in South Carolina licensed geologists and engineers are responsible for hydrological analysis necessary for compliance with State and federal laws. The actual application of hydrology is included in many projects headed by engineers, such as the design of wastewater treatment facilities, public water supply systems, dams and reservoirs, hazardous and solid waste landfills, as well as the cleaning up of hazardous waste sites. Likewise, applications of hydrology are also included within the field of work performed by licensed geologists. For example, aspects of hydrology would be included in the development of a corrective action plan for a leaking underground petroleum tank. The Department of Health and Environmental Control responded that it does not receive documents that would solely be considered as hydrology. Documents containing hydrological (surface water) or

hydrogeological data (ground water and geology) typically relate to engineering or geological aspects, and per existing statutes, require a professional engineer or geologist certification.

Additionally, the Commission found that individuals, who are interested in careers in water resources and attend school in South Carolina, must rely upon the courses offered within the geology and engineering curriculums. No university or college in South Carolina offers a degree in hydrology. In fact, information provided by the American Institute of Hydrology indicated that only four schools in the United States offer hydrology programs: the University of Idaho, Traleton State University in Texas, the University of Arizona, and the University of Nevada. In addition, the Universities of Florida and Colorado are in the process of establishing graduate programs in Hydrologic Sciences.

• **Practitioners' Use of Dangerous Devices or Substances and Performance of Dangerous Functions.** The practice of hydrology does not involve the use of dangerous devices or substances, nor the performance of dangerous functions upon members of the public. Hydrologists may work in the field collecting water samples or in laboratories analyzing samples collected, as well as performing analysis in order to predict possible occurrences which may result from different uses of water. For example, a hydrologist may be able to provide an engineer with information regarding the impact on ground water under different pumping scenarios during the design phase of a water supply system. Within hazardous waste remediation work, a hydrologist may be a member of a team assembled to evaluate the problem so that an engineer can design a remediation plan. Tasks a hydrologist may assist in during the development of a remediation plan could include drilling to secure water samples, as well as determining the water budget for the site.

• **Unsupervised Practitioners.** The potential for harm from faulty judgement is created if a practitioner works independently, or is unsupervised. The Commission sought information as to the employment of hydrologists in South Carolina, but was unable to secure this information from the South Carolina Employment Security Commission. However, testimony received during the public hearing suggested that 50 percent of the potential licensees are employed by either the State or federal government, and of the remaining 50 percent, the majority are employed by engineering or consulting firms. Additionally, staff was able to locate the listing of only one hydrologist in the *1992-1993 South Carolina Business Yellow Pages*. Therefore, based on the information available, the Commission concludes that the majority of hydrologists do not work independently, but under the supervision of a licensed professional.

Potential for Harm

Contaminated water can be harmful to the public's health, safety, and welfare. For example in 1990, the Environmental Protection Agency's Science Advisory Board's Subcommittee on Human Health recommended treating exposure to drinking water pollutants as one of only four "high-risk" human health problems warranting priority

attention by the Environmental Protection Agency (EPA). The Subcommittee report noted:

> Drinking water, as delivered at the tap, may contain agents such as lead, chloroform, and disease-causing microorganisms. Exposures to such pollutants in drinking water can cause cancer and a range of non-cancer health effects. This problem poses relatively high human health risks, because large populations are exposed directly to various agents, some of which are highly toxic (U. S. General Accounting Office, RCED-92-184, 1992).

Additionally, the EPA estimates that nearly 90,000 cases of acute gastroenteritis could be avoided each year if requirements for filtration treatment were fully implemented. The regulation of synthetic organic and inorganic contaminants is expected to reduce exposure that might lead to chronic effects, such as cancer and damage to the nervous system, liver, heart, and other organs, in nearly 3 million people each year (U. S. General Accounting Office, RCED-92-184).

Recognition of the dangers of water contamination has resulted in action at both the state and federal level, resulting in copious federal and state laws imposing standards on waste, water quality, and water use. In fact, the Department of Health and Environmental Control (DHEC) noted that many contamination cases have only recently been discovered due to enabling legislation, such as the SUPERB Act, that actually promote reporting contamination problems. In other cases, such as within the safe drinking water program, aggressive monitoring programs, mandated by the federal government, have revealed many problems concerning contamination.

In South Carolina, although problems do exist, the problem of water contamination is not severe based on a *Statewide Water Quality Assessment for FY 1990-1991: A Report to Congress Pursuant to Section 305(b) of the Federal Water Quality Act* prepared by the South Carolina Department of Health and Environmental Control. The assessment found that 93 percent of all waters the State have water quality classified as partially or fully complied with the State water classifications as established by DHEC. The assessment concluded that in rivers, pollution from nonpoint sources was responsible for most of the partial or non-support of State classified uses, while in lakes and estuaries unknown sources were responsible. The causes for partial or non-support in rivers was mainly attributable to fecal coliform contamination, and in lakes, dissolved oxygen was cited as the most frequent cause. The report concludes that toxic pollutants do not appear to be a problem in South Carolina surface waters--less than one percent of all waters assessed had heavy metal in concentrations which exceeded the EPA's criteria recommended to protect aquatic life, and PCBs, pesticides, and organics were not at levels in the water column in concentrations which exceeded the EPA's criteria recommended to protect aquatic life.

The assessment concluded that the overall quality of our State's ground-water is excellent; however, there are 1,504 instances of localized ground-water contamination. To address ground water contamination problems, DHEC has made an effort to educate

the public about ground-water and provide protection to prevent future occurrences through its permit process and by requiring the licensing of well drillers, establishing well construction standards, and regulating underground storage tanks.

Proponents of regulation contend that the intent of the proposed legislation in protecting the public health and safety and the environment is to recognize that hydrology is one of several technical disciplines including mathematics, chemistry, biology, soil science, physics, engineering and geology that contributes in an interdisciplinary manner towards the solution of public problems and needs. Hydrologists must apply these disciplines when dealing with the utilization, conservation, and preservation of the State's water resources. Further, the proponents assert that the public has a false sense of security that individuals practicing hydrology in South Carolina are qualified. Specifically, the proponents question the qualifications of licensed professional engineers and geologists practicing in South Carolina. These practitioners, the proponents contend, have only a limited approach to hydrology and do not have the interdisciplinary approach needed to perform the hydrology-related tasks.

Opponents to the regulation of hydrologists contend that hydrology is only a subportion of the knowledge needed to work in the area of surface- and ground water, and further, purport that existing categories of licenses, coupled with federal and State laws relating to water resources, adequately protect the public. A letter from DHEC concluded that the rise in detected contamination problems is attributable to more aggressive statutory or regulatory language as opposed to the absence of regulation of hydrologists.

Search for Evidence of Harm from Incompetent Hydrologists

The Commission sought to determine if sufficient and reliable evidence existed that would establish the need for regulation of hydrologists in South Carolina. The proponent group was initially asked to provide examples of harm in its response to the nine criteria. In addition, an extensive survey was conducted of state entities to search for instances of public harm due to the unregulated practice of hydrologists or hydrology-related work, and a public hearing was held to provide individuals an opportunity to present evidence of harm. As a result of these efforts, the Commission compiled the following results:

- The *Department of Consumer Affairs* stated that it has received no complaints against hydrologists, but felt that this would not be a problem experienced by a member of the consuming public, but would be more of a problem for industry.

- The Consumer Fraud Division of the *Attorney General's Office, the Board of Registration for Geologists, the South Carolina Coastal Council, the Board of Registration for Landscape Architects,* and *the Licensing Board for Contractors* all responded that no complaints had been received against, or

investigations conducted of, hydrologists. Also, none of these entities noted any problems relating to hydrologists or hydrology-related work that needed to be addressed through State regulations.

- The *South Carolina Department of Highways and Public Transportation* estimated that the Engineering Department conducts an average of ten (10) investigations annually relating to hydrology. The Department found that the problems reported include property being flooded due to increased runoff from highway construction and inadequately sized drainage structures. The Department was unable to provide the number of water-related claims received, since the claims are filed by names and not type of claim. (The Department as a whole averages over 1,000 complaints annually.)

- The *Board of Registration for Professional Engineers and Land Surveyors* contends that "hydrology" is a science that is most often included within the practices of engineering and geology, which are already regulated in South Carolina. The complaint survey returned by the Board noted that the seriousness and frequency of problems with hydrologists or hydrology-related work in South Carolina were minor. The survey stated that "hydrologist" is most frequently a job title assigned to person with specific work assignments in the area of hydrological studies. Hydrology is a focus area in the professions of engineering and geology. Hydrological work within the public domain is performed by licensed engineers, licensed geologists, or by technical workers under the supervision of such licensed professionals. The Board stated that it will perform investigations from time to time which involve evaluation of hydrological matters--ground water movement, navigation channels, impoundment structures and similar issues that are typically of a more comprehensive engineering nature. The Board was unable to provide the Commission with the actual number of complaints with issues involving hydrology received by the Board.

- The *Land Resources Conservation Commission* responded that problems relating to hydrologists or hydrology-related work in South Carolina were nonexistent. Likewise, the Commission reported that no complaints had been received. The Commission's Executive Director stated that the field of hydrology is generally considered to be a subfield of engineering. Specific engineering practices require a working knowledge of hydrologic principals for the proper design and construction of dams, highways, buildings, landfills, and other facilities. However, when hydrology relates to the flow of groundwater in subsurface rock formations, specialized geologic training and experience are necessary to understand aspects of hydrogeology for water supply, engineering application and pollution control. The Commission did not note any areas where State regulations over hydrologists or hydrology-related work needed to be implemented.

- The *South Carolina Water Resources Commission* responded that the seriousness and frequency of problems with hydrologists or hydrology-related work in South Carolina were severe. Since 1990, the Commission has received approximately fifteen (15) complaints against hydrologists or hydrology-related work. The Water Resources Commission provided the following as examples of harm resulting from the unregulated practice of hydrology:

  - A firm was hired by a municipality to site, obtain permits, and design a water intake structure to supplement an existing water source. A source of water was needed to augment the raw-water supply during droughts. No hydrologic analysis was conducted to determine the availability of water at the site, and it was determined that inadequate water was available to meet the municipality's projected demand during droughts. As a result, the permit was never issued, and the intake never constructed. Approximately $100,000 was spent on the design for this site.

  - A national firm was contracted by a water supplier to site and design a reservoir to provide water for municipal and industrial growth over a 50-year period. The analysis of the safe yield (availability of water during the worst drought ever observed) of the project was not accurate. Specifically, both federal and State laws require that a dam cannot completely obstruct the flow of water. A minimum release of water must be allowed to "pass" the dam during droughts to provide water to other downstream users and for environmental purposes (fish and wildlife, recreation, and waste assimilation). Review of the work indicated that an inadequate amount of water would be available to the water supplier during a drought. In fact, the reservoir was so under-designed that it would have actually provided little water, except to meet downstream minimum demands. The reservoir was never constructed and public monies were not wasted except to pay the consulting fees for the project. (The estimated cost of the project was approximately $8 million.)

  - In order to site a water supply, an understanding of statistical hydrology is important. In particular, the methods associated with the estimation of magnitude and frequency of low streamflows must be understood. On numerous occasions, water intake structures are designed based on one statistic known as the seven-day, ten-year low flow (7Q10). The 7Q10 is the lowest average flow over seven consecutive days which has a probability of occurring once every ten years. It is most commonly used in the design of wastewater treatment plants to determine the amount of discharge allowed into streams. However, it is incorrect to design water intake structures based on the 7Q10 alone because lower flows will be observed during more severe droughts. If the 7Q10 flow is the only flow consideration used, the water user would have inadequate water to meet demand during these periods. Flows below the 7Q10 have been observed as long as 180 consecutive days during a 50-year drought in one of the state's streams. Certainly, this period is long enough to result in severe water use restrictions and adverse effects on public health. It is difficult to place a monetary value on these miscalculations.

- Problems have also occurred associated with hydrologists, and persons with limited hydrologic background practicing hydrology. One occurrence involved the issuance of a permit to modify an existing dam to increase the safe yield of the reservoir. The permit was issued without any hydrologic analysis. The estimated total cost was approximately $6 million to $10 million. Analysis conducted by trained hydrologists after issuance of the permit indicated an alternative source located near the reservoir could have been developed for approximately $300,000 to $500,000.

- Water levels in the aquifer system in some areas of South Carolina's Coastal Plain are lowered by as much as 200 feet. The remedy for this has generally been to construct additional wells. Hydrologic information indicates that the problem is overuse of one component of the hydrologic system, withdrawal of water from the aquifer at a rate greater than which it is being replenished. In such instances, drilling of additional wells will likely only minimize the problem for a short period of time. The problem will continue until other components of the hydrologic system, such as streams, are utilized.

The *Water Resources Commission*, in a response to the Sunrise criteria, concluded that many of our lakes, streams, and aquifers have been overdeveloped, contaminated by toxic substances, and subjected to salt-water encroachment and excessive nonpoint source loadings. These problems are well documented by both State and federal agencies and have been the subject of numerous articles by the media. Single discipline approaches to addressing these and other water resources problems tend to focus inherently on one technical aspect of a problem to the exclusion of others. As an example, geologists tend to focus on the groundwater resources of a particular area while engineers tend to examine solutions using surface water sources. In reality, all aspects of the hydrologic cycle, both surface and groundwater sources, should be addressed. Many water resources problems in this state need not have occurred had the resource been properly evaluated for an intended use. Such errors directly affect the public health and welfare as well as the inappropriate use of limited state/local funds. A need exists for qualified professionals in the field of hydrology to address these and related issues systematically, using an interdisciplinary approach to solving water resources quantity and quality problems.

- During the public hearing, one proponent stated that he was aware of numerous examples of environmental problems, particularly waste management problems, resulting from work performed by unqualified individuals. He provided an example of a gas spill on federal property. In this instance, the engineer in charge took action which resulted in the aquifer being smeared with gasoline and in fact, the gasoline being trapped underneath the confining bed which created a much larger environmental problem. When questioned how a geologist would have handled the situation, the proponent stated hopefully the right way, but argued that a

hydrologist would have known the proper way to handle the problem, and this is why they are seeking licensure. No additional examples were provided to the Commission as requested.

- A representative for the American Institute of Hydrology testified that South Carolina and other states have identified some very serious ground water problems that require the special knowledge and experience of expert hydrologists to help solve these problems in a cost effective and a scientific manner that is sound. For example, nearly all buried fuel tanks underground ten or more years are potential sources for ground water contamination. Other sources of contamination including solvents used in laundries and dry cleaners, automotive engine and repair shops, storage and handling facilities of agricultural chemicals and fertilizers, industrial parks, manufacturing facilities, presently used or abandoned salvage yards, and dumps are just a few of the potential sources of ground water contamination. Further, he cited the problems found in military installations like those at the Savannah River facility. He concluded that had more people with experience in hydrology been involved over the years, the problems being experienced now would not be as bad today.

- The State Reorganization Commission requested that the *Department of Health and Environmental Control* respond to this criterion. DHEC reported that neither surface water nor ground water program staff reported any actual cases of harm or potential harm resulting directly from the absence of regulation of hydrologists. Problems associated with this specialty area of study are similar to others. Commonly, agency staff receive plans/reports containing mistakes ranging from simple arithmetical mistakes to errors that reveal a complete lack of understanding of project conditions. These errors may not meet the criteria of "harm or potential harm to the public's health, safety, and welfare," as most errors are addressed during the agency review process. What these errors do, however, is put an undue additional burden on agency staff who in essence are doing the final professional review of the document (the consultant's responsibility) in addition to assuring that regulatory requirements are met.

Proponent's Response

The water resources of the State are precious and their protection and proper use are a prerequisite to the future health, safety, and welfare of this State.

An intent of this proposed legislation in protecting the public health and safety and the environment is to recognize that hydrology is one of several technical disciplines including mathematics, chemistry, biology, soil science, physics, engineering and geology that contributes in an interdisciplinary manner towards the solution of public problems

and needs. Hydrologists must apply these disciplines when dealing with the utilization, conservation, and preservation of the State's water resources.

Critically important lakes, rivers, streams, and aquifers have been overdeveloped, contaminated by toxic substances, subjected to salt-water encroachment and have received excessive non-point source loadings. These problems are well documented by Federal and State agencies and have been the subject of numerous stories and articles in the media. Public interest groups regularly decry the ongoing impact on the water resources, including water quality. Single discipline approaches to addressing these and other water resource problems, which tend to inherently focus on one technical aspect of a problem to the exclusion of others, may result in an exacerbated problem. A need exists for qualified professionals in the field of hydrology to address these and related issues systematically using an interdisciplinary approach to solving water-quality problems.

Commission's Conclusion

The State Reorganization Commission concluded that the unregulated practice of hydrologists does not pose a danger to the public.

The Sunrise Law requires that proposals show the harm that occurs to the public in absence of regulation and must also demonstrate that licensing is the only way to address the public's need to be protected. The proponents of regulation assert that the public is not adequately protected by the current licensing of engineers and geologists. However, if instances of harm are occurring, the Commission finds that strengthening existing laws could remedy the problems, see Criterion Four, page 39. In addition to the licensing of engineers and geologists, the copious State and federal laws targeted at both the quality and quantity of our State's water resources should adequately protect the public.

The lack of complaints dealing with hydrology-related issues makes it difficult to justify imposing State regulation on practitioners. The Water Resources Commission most frequently cites the lack of hydrologic analysis as the problem encountered as a result of the unregulated practice of hydrology. The Commission finds that these problems could be addressed through the promulgation of regulations requiring that specific hydrologic data be submitted prior to the issuance of a permit. Alternatively, the application could be returned for resubmission with the necessary hydrologic data. The Commission did provide one example where money was expended in excess of what the Commission stated would have been necessary. In this instance the Water Resources Commission could have filed a complaint with the Board of Professional Engineers and Land Surveyors against the engineer who attested to the work. Alternatively, action seeking retribution could have been initiated by the party for which the work was performed. The Commission finds that in the first two examples, the public was protected with the current structure, since the additional revenues were not expended. In instances where the Commission found that the work submitted by engineers or geologists was inadequate or showed a degree of incompetency, these cases

could have been referred to the appropriate board for investigation and necessary disciplinary action. The Board of Registration for Professional Engineers and Land Surveyors is responsible for ensuring that licensed engineers are competent to practice engineering, but in order for the Board to be effective, problems must be brought to the Board's attention.

State laws have been implemented which address concerns expressed by the Water Resources Commission. For example, the South Carolina Department of Health and Environmental Control has been charged with the responsibility of identifying and abating water contamination problems. Additionally, the Water Resources Commission under the Groundwater Use Act, upon the request of a county, municipality, or other political subdivision may declare and delineate an area as a capacity use area. Within this responsibility, the Commission through regulations can guard against salt-water encroachment and protect against or abate sinkholes. Further, as a result of government restructuring, the duties of the Department of Health and Environmental Control will be expanded to include all of the functions currently performed by the Coastal Council and the regulatory responsibilities of the Land Resources Conservation Commission and the Water Resources Commission.

The movement for regulation of hydrologists is coming primarily from the implementation of the licensure for geologists, which has restricted to licensed professional geologists the independent practice of individuals dealing in ground water. Individuals who have technical knowledge of hydrology, but fail to meet the educational requirements for licensure as a geologist or engineer, and are no longer able to directly submit reports to DHEC, must work under the supervision of a licensed individual. The Commission acknowledges the need for competent hydrologic analyses; however, it finds that hydrology constitutes only one part of a project design which must ultimately be prepared under the direction of a licensed engineer or geologist.

Criterion Two

Whether the practice of the occupation requires such a specialized skill that the public is not qualified to select a competent practitioner without assurances that minimum qualifications have been met.

Explanation of Criterion

Criterion Two assesses the degree to which the public can be expected to judge the quality and outcome of the professional services being rendered. In the case of hydrological services, to what extent can a consumer recognize reliable sources of hydrological advice?

One objective of occupational regulation is to reduce consumer uncertainty about the quality of professional services by guaranteeing that practitioners meet and adhere to a minimum quality standard. On the other hand, regulation is more difficult to justify in those cases where consumers rely on a number of information sources, other than a state-issued credential, when seeking a competent professional. These methods include reliance on their own experiences or the experiences of others, referrals from other practitioners, information from publications, telephone directories, or professional associations.

In order for an occupation whose practice is generally independent and autonomous to meet this criterion, evidence must be presented to show: (a) members of the public play an active role in choosing a practitioner; (b) information about qualifications of the practitioner is an important element in making that choice; and, (c) no existing mechanism provides such information as effectively as would the issuance of a State credential.

Commission's Research

The Commission sought to determine the degree to which the public is faced with selecting a hydrologist, as well as the degree to which hydrologists practice independently. The majority of services provided by hydrologists do not lend themselves to a member of the consuming public. For example, the general public would not be involved in selecting an individual or firm to assist in: selecting a site for hazardous or municipal landfill; locating the source of point and non-point pollution in lakes and rivers; cleaning up a contaminated aquifer through bioremediation; or, selecting a site for a water supply system or wastewater treatment facility. Instead these responsibilities would be assumed by governmental entities or businesses. For agricultural purposes, services such as the design of drainage systems, irrigation systems, and soil and water conservation systems would be available through licensed agricultural engineers.

Additionally, the Soil Conservation Service of the United States Department of Agriculture provides assistance to individuals, groups, organizations, cities and towns,

and county and State governments to reduce the costly waste of land and water resources. Staff include soil conservationists, engineers, soil scientists, agronomists, biologists, economists, foresters, geologists, landscape architects, plant material specialists, cartographers, environmental specialists, recreation specialists, social scientists, and archaeologists. Technical assistance available through the local conservation districts, includes, but is not limited to:

- Onsite assistance to farmers, ranchers, foresters, and others, in planning and carrying out a long-term conservation programs;

- Assistance in designing, laying out, and checking the construction and maintenance of dams, terraces, and other structures;

- Assistance to owners and operators of rural land in controlling sources of water pollution; and,

- Disseminating information about alternative land uses and treatments for controlling erosion and reducing sedimentation, conserving water used in agriculture, and preventing flood damage in upstream areas.

To determine the degree of independent practice, the Commission turned to various sources. The following is a summary of what was found:

- Based on information received during the public hearing regarding the potential licensees, about 50 percent of the potential licensees are employed by either the State or federal government. The remaining 50 percent are employed in the private sector, mainly by engineering or consulting firms.

- According to the South Carolina Employment Security Commission, in 1986 there were 149 geologists, geophysicists, and oceanographers employed in South Carolina. Between 1986 and 2000, 210 new jobs are predicted for geologists. Information as to place of employment was unavailable. (Hydrologists are included within this category.)

- According to information from the United States Department of Labor, geologists and geophysicists held about 48,000 jobs in 1990, not including those employed by colleges and universities. Of these 48,000, 40 percent were employed by oil and gas companies or oil and gas field services firms; many others geologists worked for consulting firms and businesses, especially engineering and architectural services; and, about 14 percent were self-employed, the majority as consultants to industry or government. The federal government employed about 6,000 geologists, geophysicists, oceanographers, and hydrologists in 1989.

Based on the above information, the Commission next sought to determine how a private firm or the government could determine the competency of a hydrologist. Applicants' educational background and experience can be reviewed by industry and

government to determine if one would meet the necessary qualifications. Additionally, national certifications such as those offered by the American Institute for Hydrology and the National Ground Water Association could be considered. (These certifications are discussed more fully under Criterion Three, page 26.)

At the State government level, both the South Carolina Water Resources Commission and the Department of Health and Environmental Control, employ hydrologists. As of March 1993, 79 of the 94 hydrologist positions available were filled. The State classification system establishes the minimum education and experience qualifications necessary for employment. In South Carolina, the minimum education and experience qualifications into an entry level position at DHEC is a bachelor's degree in hydrology, geology, or geological engineering. The Water Resources Commission requires a bachelor's degree in hydrology, hydrogeology, or water resources; or a bachelor's degree in geology, geological engineering with either nine (9) credit hours in hydrogeology, hydraulics, or geochemistry, or one (1) year experience in ground-water evaluation. The senior level hydrology position at DHEC requires either a master's degree in hydrology or geological engineering and four (4) years experience in hydrologic or geologic investigations including two (2) years in a supervisory or administrative capacity; or, a bachelor's degree in hydrology, geology, or geological engineering and six (6) years experience in hydrologic investigations including two year in a supervisory or administrative capacity. The Water Resources Commission requires either a master's degree in hydrology, hydrogeology, or water resources and four (4) years experience in hydrologic investigations; or a master's degree in geology or geologic engineering with either nine (9) credit hours related to hydrology and four (4) years of related experience or five (5) years related experience; or a bachelor's degree in hydrology, hydrogeology, or water resources and six (6) years related experience; or a bachelor's degree in geology or geologic engineering with either nine (9) credit hours related to hydrology and six (6) years related experience or seven (7) years related experience. In addition, at least two years must have been in a supervisory or administrative capacity.

Proponent's Response

There is no regulation or legislation that provides assurance to the public that practitioners have the minimum qualifications needed to address multidisciplinary water resources problems. The public has been led to believe that credentials in other professions qualify these practitioners to practice in hydrology. The complexity of hydrologic problems such as overdevelopment and contamination of our water resources requires systematic interdisciplinary solutions based on broad educational and occupational experience and knowledge.

There are no provisions within current registrations of other professions, such as engineering or geology, that are specific to the practice of hydrology. There are no mandated credential verifications or examinations to provide assurances to the general public that members of other professional groups have the minimum qualifications needed to practice in the field of hydrology or water resources. Further, the existence

of current registrations has made it difficult and perhaps impossible for qualified hydrologists to formally practice their profession and certify their work.

Commission's Conclusion

The State Reorganization Commission concludes that Criterion Two is not met, since the public does not play an active role in the selection of hydrologists. Furthermore, if a member of the consuming public was in need of hydrologic services, one would be able to judge the relative merits of services offered by, and select a competent practitioner with, existing resources.

The Commission concluded that the general public has little direct access to hydrologists in unsupervised, independent practice. If a member of the consuming public was in need of hydrologic services, existing resources, including licensed engineers and geologists, could provide these services. Industry and governmental entities, on the other hand, can rely upon national certification programs, recommendations of others, and a thorough evaluation of applicants' education and experience. Both State and federal government have classification systems to establish the necessary qualifications for individuals hired to practice hydrology.

Criterion Three

Whether the public is or may be effectively protected by other means, such as academic credentials, certification by nongovernmental entity, or membership in an occupational association.

Explanation of Criterion

Criterion Three seeks to determine whether existing nongovernmental means are sufficient to protect the public. Evidence presented must show why a ***state-issued*** *credential is necessary to allow the public to identify competent practitioners. This guideline is especially significant for professions that already have a strong, recognized private system of credentialing. If the proposed requirements for state credentialing are essentially identical to a recognized system of private credentialing, there should be compelling evidence to show why such redundancy is in the public interest.*

Commission's Research

Existing Nongovernmental Means of Protection

The Commission identified two organizations involved in nongovernmental credentialing of hydrologists or ground water professionals. Both of these organizations have established standards for certification, including education, experience, examination, and continuing competency, as well as providing a means of identification of credentials received. The American Institute for Hydrology offers certifications as a Professional Hydrologist (PH), Professional Hydrogeologist (PHG), and Professional Hydrologist-Ground Water (PH-GW). The National Ground Water Association offers certification as a Certified Ground Water Professional (CGWP). The credentialing offered by these two entities is discussed below.

The **American Institute of Hydrology** was founded in 1981 to promote hydrology as a science and a profession and to help protect public interest and the profession from non-professional practice. It is the only nation-wide organization that certifies the professional competence and ethical conduct of professionals in all fields of hydrology. The program began certifying individuals in 1982, and during that year 22 applicants were certified. As of June 1, 1992, the Institute had 900 members. In South Carolina, nine (9) individuals are certified by AIH. In addition to the certification process, the AIH provides educational programs and services designed to improve the professional skills and abilities of members, the professional community, and the public at large.

To be registered as a Professional Hydrologist, Professional Hydrogeologist, or Professional Hydrologist (Groundwater), the following requirements must be met:

Educational:

- Graduate with a major in hydrology or hydrogeology, physical or natural sciences, or engineering, including the completion of 5 semester or 8 quarter hours each in chemistry, physics, and calculus, and 25 semester or 37 quarter hours in hydrology/hydrogeology and related courses.
- The above educational requirements may be waived for individuals who received their last degree before 1970 and have proven professional competence and ability in a responsible position and in publications in hydrology/hydrogeology.

Experience:

- Minimum of 8 years after the award of a Bachelor's degree.
- Minimum of 6 years after the award of a Master's degree.
- Minimum of 4 years after the award of a Doctor's degree.

Additional Criterion:

In addition to the education and experience requirements, applicants must perform substantive original investigations in some phase of the hydrological sciences and publish the results in professional publications or reports of agencies, institutes, or consulting firms. This requirement may be waived for individuals rendering superior service through teaching and/or administrative and technical work.

Examination:

Applicants are required to pass an examination which consists of two parts. Part I tests the understanding of basic principles that go beyond empirical formulas in analyzing complicated situations of surface and ground water hydrology. The basis for these principles include mathematics, physics, chemistry, geology, meteorology, engineering, soil science, and other related disciplines. This is a four-hour examination which consists of 100 short problems and general knowledge questions.

Part II tests the applicant's ability to sort out meaningful data and apply hydrogeological analysis to practical problems of engineering design, water resource management, regional or on-site investigations, municipal or land use planning, research formulations, etc. This portion of the examination is designed to demonstrate the depth expected of practicing hydrologists and hydrogeologists in formulating practical solutions. This is an open book examination and permits the use of a computer. Part II consists of five problems, each designed to be completed in one or two hours, with an option to work three problems.

Recertification:

Recertification is required every five years.

The **National Ground Water Association** offers a certification as a Certified Ground Water Professional to applicants who have a baccalaureate degree, and at least seven years of progressively more responsible professional experience, during which full competence has been demonstrated in the application of scientific or engineering principles and methods in the execution of work involving (1) the understanding of the

occurrence, movement, and composition of ground water; (2) the development, management, or regulation of ground water; or, (3) the teaching and research of ground water subjects at the university level. This certification must be renewed every three years. To be recertified, registrants are required to obtain 36 hours of professional development credits over the three-year period.

Proponent's Response

The public, in general, can make no such differentiations. There are presently no assurances to the general public that they or the State's water resources are effectively protected by other means such as academic credentials, registration by non-government entities such as licensing boards in related fields or memberships in occupational associations. Membership in occupational associations related to hydrology is not necessarily based on qualifications.

Hydrology is the study of the properties, distribution, and circulation of water on or below the earth's surface and in the atmosphere. The science includes the study of water movement through the hydrologic cycle and the distribution, storage, quality, and circulation of water through aquifers and streams as it returns to the sea. Too often, the utilization of the resource has been based on the size of a pump, pipe, or storage facility or whether the water is on or beneath the surface of the earth and not on the ramifications of utilization of the resources for an intended purpose. The resource has been degraded by well-intended and educated individuals and corporations, owing in part to a lack of understanding of hydrologic processes. Overpumping of South Carolina Coastal Plain aquifers in some areas has resulted in degradation of the quality of water from these aquifers by saltwater encroachment, a process that can be avoided if the resource limitations are fully addressed. The quantity and quality of the resource is finite and not unlimited.

At the present time, a degree in a single, related discipline may be perceived to satisfy all the requirements needed to address questions relating to water resources when, in fact, there may be little or no formal course work in a related field or study which provides a thorough, systematic understanding of hydrology. University support of the hydrologic sciences is emerging, but, as yet, is meager. Even so, current curriculums tend to fragment the science of hydrology because water beneath the surface is treated as an entity different from that of water on the surface of the ground even though its origin and behavior is similar. Undergraduate degrees in related fields may devote only part of a single course to the study of hydrology.

Passage of this legislation would show support for emerging university programs in formalizing the science of hydrology and to encourage students to enter such programs.

Commission's Conclusion

The State Reorganization Commission concludes that Criterion Three is met, since the public may rely on existing credentialing systems to identify hydrologists who have qualified by education, experience, and examination.

The Commission found that a system of private credentialing for hydrologists has been established. Given the absence of documented harm occurring in South Carolina as a result of the practice of hydrology, coupled with existing regulation of the practices of engineering and geology, the redundancy involved in issuance of a state-issued credential is not in the public interest at this time. Additionally, the Commission found that consumers generally do not need the services of a hydrologist; however, if a need were to arise the services of an engineer or geologist could be sought. Individuals engaged in purely hydrologic services can avail themselves of the certifications offered by the American Institute of Hydrology or the National Ground Water Association. Additionally, engineering and consulting firms in need of a qualified hydrologist could consider national certification as a factor in employment decisions.

Criterion Four

Whether current laws are ineffective or inadequate to protect the public's health, safety, and welfare and whether strengthening the laws would provide adequate protection to the public.

Explanation of Criterion

Criterion Four to determine whether adequate laws governing either standards of practice or devices, procedures, and/or substances used in a practice, exist, are effectively enforced, or could be strengthened to protect the public.

Commission's Research

Numerous State and federal laws exist that are intended to protect the public from hazards threatening the quality and quantity of our State's water resources. Monitoring and enforcement of these laws require the skills of a number of trained professionals. In South Carolina, licensed professional engineers and geologists have been recognized as qualified to oversee, as well as practice, hydrology. The licensing boards responsible for these professionals are responsible for ensuring that a minimum level of competency has been gained prior to licensure and must ensure that competency is retained through their disciplinary and enforcement powers.

Existing Federal Laws

In the early 1970s, people began to recognize the dangers posed by hazardous waste and toxic chemicals. As awareness began to be raised that landfills were polluting underground water supplies, harming farmland, and causing other ecological damage, a movement began to safeguard against hazardous waste contamination. The federal Environmental Protection Agency is largely responsible for the federal statutes aimed at protecting and cleaning up the nation's water resources. The following Table summarizes some of the federal laws which have been implemented.

SUMMARY OF FEDERAL STATUTES RELATING TO WATER RESOURCES

Resource and Conservation Recovery Act (RCRA)

This Act is targeted at regulating the handling and disposal of waste, especially hazardous waste. RCRA creates a system of hazardous waste management from the point of generation to its ultimate disposal. The statute establishes standards to be used by generators and transporters of hazardous waste, as well as the facilities which treat, store, or dispose of the waste. In South Carolina, the Department of Health and Environmental Control is responsible for the administration of this law.

Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)

This Act, enacted in 1989, authorizes the Environmental Protection Agency to take action against ground water contamination caused by inactive waste sites, accidental chemical releases, or other threatening situations involving hazardous substances. This may be accomplished through the use of the $8.5 billion trust fund created by Superfund to conduct its own clean up at a site posing hazardous substance threats. Additionally, the EPA can order the persons or industries responsible for creating the waste to clean up the problem or it may sue for reimbursement. Irrespective of the source responsible for the clean up, regulations promulgated by the EPA must be followed. In South Carolina, the Department of Health and Environmental Control is responsible for the administration of this law.

Safe Drinking Water Act (SDWA)

Under this Act, the EPA is required to set maximum levels for health-threatening contaminants in drinking water supplied by public water systems. The EPA is also authorized to protect underground sources of drinking water from contamination caused by injection of wastes and other substances into underground wells.

This Act additionally provides for the designation of any aquifer that serves as an area's principal source of drinking water as a "sole source aquifer." When designated as a sole source aquifer, federal agencies are barred from granting financial assistance to any project that could contaminate the aquifer; thereby creating a significant health hazard.

The Wellhead Protection Program requires states to create a protective scheme for areas surrounding water wells or wellfields, in order to prevent contaminants from entering groundwater in these areas, and thus, affecting the public water supply.

Clean Water Act (CWA)

This Act is aimed at controlling the discharges of pollutants into the nation's lakes, rivers, streams, and other surface waters. One critical provision of this Act is the National Pollution Discharge Elimination System (NPDES), which prohibits the discharge of pollutants into water except in accordance with a permit issued by EPA, or a state agency. In South Carolina, the Department of Health and Environmental Control is responsible for the administration of this law.

Toxic Substances Control Act (TSCA)

This Act authorizes the EPA to control the manufacture, use, and disposal of toxic chemicals. Manufacturers of new chemical or chemical mixtures must give a "pre-manufacture notice" to the EPA prior to the chemical being marketed. This notice allows the EPA to determine if the use of the chemical or chemical mixture will pose a significant threat to human health or the environment.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA regulates pesticides by requiring that manufacturers register pesticides with the EPA so the agency can impose any necessary restrictions on their use. The EPA can also prohibit use of the pesticide entirely if it will have unreasonably adverse effects on the environment, including groundwater.

Surface Mining Control and Reclamation Act (SMCRA)

Surface coal-mining activities are regulated under this Act to prevent contaminants from entering groundwater. Coal mining operations must receive a permit from the Department of the Interior or authorized state agency and operating requirements to protect ground water from toxic mine drainage. In South Carolina, the Land Resources Conservation Commission is responsible for the administration of this law.

Existing South Carolina Laws and Regulations

Beginning in July 1994, the regulatory functions of South Carolina's water resources will be administered by the Department of Health and Environmental Control. Act 181 of 1993, which restructured South Carolina state government, expands the duties of DHEC through the incorporation of existing statutes for DHEC, the Coastal Council, and the regulatory divisions of the South Carolina's Water Resources Commission and the Land Resources Conservation Commission into the newly configured department. The following provides a brief description of some of the responsibilities for these agencies as they now exist.

The **Department of Health and Environmental Control (DHEC)** administers health and environmental programs and provides services which affect the health and well-being of all South Carolinians. The Department is the sole advisor to the State in matters pertaining to the public health and has the authority to abate, control, and prevent pollution. Some of the responsibilities of the Department relating to water resources are briefly outlined below.

- The Bureau of Water Pollution Control is charged with the development of rules and regulations for pollution abatement, initiation of investigations to determine pollution of the environment and enforcement action to abate any violations, require and grant permits for disposal of wastes into the environment and construction of waste treatment facilities. To enforce the correction of violations found, the Department may assess a civil penalty. This Bureau administers the National Pollutant Discharge Elimination System permit program, which includes permit issuance, administration, monitoring, and enforcement. DHEC also ensures that proposed sewerage treatment facilities use the best available technology to comply with State and federal regulations. The Bureau reviews applications for permits from industries, cities, towns, and subdivisions to construct treatment facilities and to discharge treated wastewater into nearby streams. DHEC audits monthly monitoring and surveillance reports to ensure that none of the treated wastewater discharged by these facilities will pollute the State's waterways.

- The Bureau of Drinking Water Protection ensures the safety of public drinking water by reviewing plans for all proposed public water systems, inspecting them during and after construction, and by conducting routine monitoring programs for bacteriological, organic and inorganic chemical, and radiological contamination. The Department is charged with establishing such standards as are necessary to protect the public and is to pursue legal remedies for problems which go uncorrected. Additionally, the Department is to preserve and protect the quality of surface waters and ground waters as sources of drinking water through the regulatory control of underground storage tanks including spills, leaks, and discharges of petroleum products from such tanks.

- The Bureau of Solid and Hazardous Waste Management operates under the auspices of both federal and State laws to provide for the regulation of the generation, storage, transportation, treatment, and disposal of hazardous and infectious waste to assure the safe and adequate management of these wastes. The Department is charged with establishing a fund to ensure availability of funds for contingencies arising from hazardous waste spills or accidents at permitted facilities or at pre-existing abandoned sites; to implement and enforce the federal Hazardous Waste Cleanup Law and to recover costs including punitive damages. Under State law, the Department is to regulate the methods of disposition of garbage and any like refuse matter. Additionally, the Bureau provides assistance to municipalities, counties, and industries for more effective and efficient waste disposal systems; promotes materials and energy recovery projects; evaluates abandoned and closed disposal sites to determine action needed for clean up of those threatening the public health or environment; and exercises authority over the collection, transfer, storage, treatment, and disposal of solid and hazardous wastes.

The **Water Resources Commission** is responsible for establishing a coordinated, integrated State water resources policy; promoting plans and programs for the development and enlargement of the water resources of the State; and, securing the maximum beneficial use and control of the State's water resources. Programs administered by the Commission include, in part:

- The Groundwater Use Act was implemented to conserve and protect, prevent waste, and to provide and maintain conditions which are conducive to the development and use of the water resources of our State. The Groundwater Use Management Program is responsible for the declaration, delineation and modification of capacity use areas of the State where it finds that the use of groundwater requires coordination and regulation for the protection of the rights of property owners and the public interest. To date, two capacity use areas have been designated by the Commission--the Waccamaw, which encompasses Horry, Georgetown, and Brittons Neck areas of Marion County; and, the Low Country, which encompasses Beaufort, Jasper, and Colleton counties.
- The Interbasin Transfer Permitting Program provides for the regulation of significant interbasin transfers of surface water in South Carolina. The enabling legislation requires a permit from the Commission for any interbasin transfer of surface water amounting to one million gallons of water a day, or five percent of the seven, ten year low flow, whichever is less, between the fifteen major river basins in the State. This program was designed to protect the public's interest for both the receiving and losing river basin. In making its decision, the Commission is to protect water quality, project future water needs, consider the impact on interstate water use, as well as consider the feasibility of using alternative sources of water supply and their comparative results. Additionally, DHEC must certify that the proposed interbasin transfer will not violate the water classification standard system or adversely affect the public's health and welfare.

- The Drought Response Program establishes procedures by which the State's water resources can be monitored, managed, and conserved in the best interest of South Carolinians during periods of drought.
- The State Clearinghouse Review reviews surface water plans, projects, and feasibility studies produced by federal, State, and local agencies for consistency with State planning objectives.
- Laboratory services identify the need for, and assist in the collection of, ground and surface water samples, conducting all physical and chemical analyses, and providing interpretation for use in special and on-going water resources investigations.
- The Water Hydrology Program conducts hydrological studies and other activities necessary for the proper use and protection of the State's water resources.
- The Commission also conducts multi-objective studies designed to map the level of lateral and vertical extent of aquifers; collects data concerning water use, water quality, and well construction; and, evaluates any problems concerning the development of ground-water resources.

The mission of the **Land Resources Conservation Commission** is to protect and enhance the environment and protect the health, safety, and welfare of the public through an integrated program of conservation planning, education, technical assistance, and regulation. The Commission strives to accomplish this, in part, through administration of the Soil and Water Conservation Districts Law; implementation of programs for erosion and sediment control; flood control; nonpoint source pollution control for agriculture, construction, urban stormwater runoff and mining; and, dam and reservoir safety. The Commission also is responsible for the South Carolina Mining Act. In carrying out this Act, the Commission is to ensure that the usefulness, productivity, and scenic values of all lands and waters receive the greatest degree of protection and restoration.

The **South Carolina Coastal Council** is empowered to develop and implement a comprehensive coastal management program. The Council's regulatory authority is limited to eight coastal counties: Beaufort, Jasper, Colleton, Berkeley, Charleston, Dorchester, Horry, and Georgetown. In these counties, jurisdictional boundaries are established for the "critical areas"–the beaches, tidelands, and coastal waters. The Coastal Council is charged with carrying out the Coastal Zone Management Act, with duties that include permitting functions, assisting local beachfront communities in the development and implementation of comprehensive local beachfront management plans and a beachfront monitoring program designed to determine the stability of the beach.

In addition to the above oversight and regulatory responsibilities by the various State agencies relating to the State's water resources, the **Board of Registration for Professional Engineers and Land Surveyors** and the **Board of Professional Geologists** share the responsibility of licensing professionals who oversee, as well as provide hydrologic services, within their existing scope of practices. Both of these licensing boards are responsible for ensuring that a minimum level of competency is obtained

prior to licensure and that this competency is maintained through the enforcement of the Boards' disciplinary powers.

Proponents of the legislation contend that "existing laws for related, but independent, disciplines are misleading the public to believe that hydrologic issues are adequately considered for the protection of public health and safety and the environment." They further assert that the proposed legislation would better protect the public since applicants would be schooled through the interdisciplinary educational and experience criteria established by the proposed legislation. The proposed bill would require graduation in an approved hydrologic or related science curriculum of four or more years, five years experience as a hydrologist-in-training, and passage of board approved examination.

One proponent of the legislation noted that qualified hydrologists, particularly the ground-water hydrologists, are beginning to be excluded from the list of specified professionals who are accepted as being qualified for conducting and certifying ground-water related issues. This proponent argues that individuals with degrees and backgrounds in hydrology, ground-water hydrology, and water resources typically would not be able to qualify and obtain registration either as a Professional Engineer (PE) or Professional Geologist (PG). However, under current statutory requirements, the Department of Health and Environmental Control requires that submitted documents be stamped either by a PE or PG. DHEC stated that the agency "does not receive documents that would solely be considered as hydrology. Documents containing hydrological (surface water) or hydrogeological (ground water and geology) typically related to engineering or geological aspects, and per existing statutes, require a professional engineer of geologist certification." Examples provided included, a surface water hydrological evaluation (for example, determining wastewater loading to a stream) will be a part of a wastewater system design where the entire project/plan is certified by a professional engineer. The evaluation of hydrological parameters of the subsurface must consider the ambient geological factors and is, therefore, certified by a professional geologist.

To be a licensed professional engineer in South Carolina, one must be a graduate of an Engineering Accreditation Commission/Accreditation Board for Engineering and Technology accredited engineering curriculum of four or more scholastic years and complete a five-year internship under a licensed professional engineer. In South Carolina, the practice of engineering is defined as a "professional service of creative work requiring engineering education, training, experience, and the application of special knowledge of the mathematical, physical, and engineering sciences to professional services or creative work as consultation, investigation, evaluation, planning, design, and observation of construction for the purpose of evaluating compliance with specification and design in connection with public or private utilities, structures, buildings, machines, equipment, processes, works, or projects." Engineers are not licensed by specific disciplines in the State; however, areas of specialization such as civil, agricultural, mechanical, chemical, and environmental engineering are recognized and licensees are administered a national examination based on their area of specialization. For example,

the examination for civil/sanitary/structural engineering covers areas which include design and analysis of buildings and special structures, foundations and retaining structures, drainage/flood control systems, water supply systems, wastewater treatment systems, and solid/hazardous waste systems. Agricultural engineers are tested in areas that include design of drainage systems, irrigation systems, waste management systems, soil and water conservation systems, and environmental systems. The Board is charged with ensuring that licensed engineers provide services only in one's field of competence.

To determine the scope of practice for geologists, particularly as it relates to hydrogeology, the Commission reviewed applicable laws and regulations. Section 40-77-10 (4) of the South Carolina Code of Laws, 1976, as amended, defines geology as "the science dealing with the earth and its history; investigation, prediction, and location of the materials and structures which compose it; the natural processes that cause change in the earth; and the applied science of utilizing knowledge of the earth and its constituent rocks, minerals, liquids, gases and other materials for the benefit of mankind." This definition does not include work that requires engineering education, training, and experience. Based upon this definition, the Board includes hydrogeology or the movement of ground water beneath the earth's surface within the scope of practice for geologists.

During the public hearing, a representative of the Board testified that between 50 and 60 percent of the 900 registered professional geologists in South Carolina are hydrogeologists, which means they have been trained and are practicing in areas that require them to have expertise in both geology and ground water movement. These geologists work in the area of environmental problems, such as the Savannah River Site, the Pinewood Landfill, leaks from gasoline tanks, landfill sitings, etc. These geologists will assess these sites and then make recommendations to engineers for the ultimate design of the clean up plan. According to the Board representative's testimony, probably one-half of the examination required for licensure is related to ground water.

The Environmental Protection Agency (EPA) has recently amended its regulations to broaden the field of qualified practitioners within the statutes governing municipal landfills (§ 258.50 (f)) and hazardous waste management (§ 260.10). The EPA has defined "qualified ground-water scientist" as a scientist or engineer who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has sufficient training and experience in groundwater hydrology and related fields as may be demonstrated by State registration, professional certifications, or completion of accredited university programs that enable that individual to make sound professional judgements regarding ground-water monitoring, contaminant fate and transport, and corrective-action. The definition found in Section 260.10 was only amended in June 1992, to expand the definition of qualified ground-water scientist beyond "qualified geologist" or "geotechnical engineer." In its discussions as to the reasons for broadening the definition, the EPA commented that authorizing only "geologists and geotechnical engineers" may not clearly include "hydrogeologists." Inclusion of hydrogeologists was necessary, since a geologist or geotechnical engineer may not be qualified to perform

hydrogeological assessments. In South Carolina, the Board of Registration for Geologists does not license by specialty area, such as hydrogeology.

Review of Other States' Use of National Certifications

According to information received from one opponent of the legislation, four states are using national certification as a means of identifying competent practitioners. A brief description follows.

Iowa, within its Underground Storage Tank Law, requires registration of groundwater professionals. The regulations implementing this law define a groundwater professional as one who provides subsurface soil contamination and groundwater consulting services, or who contracts to perform or who supervises remediation or corrective action services at leaking underground storage tank sites. Individuals who are recognized as qualified include:

- Persons certified by the American Institute of Hydrology as a Professional Hydrologist, Professional Hydrogeologist, or Professional Hydrologist (Groundwater);
- Persons certified by the National Water Well Association or Association of Groundwater Scientists and Engineers as a Groundwater Professional;
- Professional Engineers registered in Iowa;
- Persons certified by the American Board of Industrial Hygiene as an Industrial Hygienist;
- Professional Geologists certified by a national organization (e.g., American Institute of Professional Geologists, American Association of Petroleum Geologists, Society of Independent Earth Scientists);
- Persons with five years of direct or related experience and training as a groundwater professional or in the field of earth sciences as of June 10, 1991. Experience must include a minimum of at least two years of education and training and two years experience as a groundwater professional; and,
- Persons with a license, certification, or registration to practice hydrogeology or groundwater hydrology issued by any state or by a national organization, provided the license, certification, or registration requires, at a minimum: a bachelor's degree from an accredited college and five years of related professional experience.

According to staff of the Iowa Department of Natural Resources, as of April 21, 1993, 308 applications had been received, of which five (5) or six (6) had been denied registration. A break-down of qualifications of registrants was not available. Also, due to the fact that the program is new (registrants were to be registered by January 1, 1992), the Department had received no complaints.

Illinois, within its hazardous waste management system, defines a "qualified groundwater scientist" as a scientist or engineer who has received a baccalaureate or post-graduate degree in the natural sciences or engineering, and has sufficient training

and experience in groundwater hydrology and related fields, as demonstrated by state registration, professional certifications, or completion of accredited university courses that enable the individual to make sound professional judgements regarding groundwater monitoring and contaminant fate and transport. A board Note to this section states: "State registration" includes, but is not limited to registration as a professional engineer with the Department of Professional Regulation. "Professional certification" includes, but is not limited to, certification under the certified ground water professional program of the National Ground Water Association.

The State of Virginia has defined "qualified groundwater scientist" within its solid waste management regulations as "a scientist or engineer who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has sufficient training and experience in groundwater hydrology and related fields as may be demonstrated by State registration, professional certifications, or completion of accredited university programs that enable that individual to make sound professional judgements regarding groundwater monitoring, contaminate fate and transport, and corrective action."

Under the grandfathering provisions of the State of Kentucky's licensure program for geologists, the experience requirements for the National Ground Water Association's Certified Ground Water Professional will meet the experience requirements for licensure. Applicants may apply for licensure under the grandfathering provisions through January 1994.

In South Carolina, the existing laws and regulations for engineers and geologists appear to limit the qualifications of those recognized to submit plans/reports to only those individuals licensed by the boards of engineering and geology. When queried as to whether or not any reports or designs required by State or federal laws and regulations could be submitted by a hydrologist, the Department of Health and Environmental Control responded that: "The agency does not receive any documents that would solely be considered as hydrology. Documents containing hydrological (surface water) or hydrogeological (ground water and geology) typically relate to engineering or geological aspects, and per existing statutes, require a professional engineer or geologist certification."

Proponent's Response

There are at present no laws in this state relating to the field of hydrology that protect the public's health, safety, and welfare. Self-proclaimed practitioners who are not experienced in the interdisciplinary nature of water resources may mislead the public and cause damage to our present and future water resources. Existing laws for related, but independent, disciplines are misleading the public to believe that hydrologic issues are adequately considered for the protection of public health and safety and the environment.

The intent of this bill is to protect the public health and safety and the environment by providing an objective examination and evaluation of educational backgrounds and experience of those who wish to become registered professionals in the field of hydrology. Individuals meeting the minimum, interdisciplinary educational and experience criteria established by the proposed legislation will be licensed to practice in the field of hydrology. As a result, the public will be assured that individuals registered to practice hydrology are qualified to address the complex, pressing water-related environmental problems under consideration within the State of South Carolina presently and in the future.

Commission's Conclusion

The State Reorganization Commission concludes that existing State and federal laws and regulations adequately safeguard the public from the potential threats posed by the non-regulated practice of hydrologists.

Both the federal and South Carolina state governments have enacted numerous and broad laws and regulations targeted at conserving and protecting our nation's water resources and cleaning up contaminated resources. Additionally, the licensing functions of the Board of Registration for Professional Engineers and Land Surveyors and the Board of Registration for Geologists provide the State with assurances that individuals practicing within these fields are qualified. However, if the General Assembly finds that a need exists for the explicit recognition of "hydrogeologists," the statutes governing licensed geologists could be amended. The Board of Registration for Geologists does not issue licenses according to one's specialty area; however, in its roster of licensees, individuals are identified by practice areas including hydrogeology, mining geology, engineering geology, and mineral exploration.

The absence of evidence of harm occurring in South Carolina which can be directly related to the non-regulation of hydrologists suggests that existing laws and regulations are adequate to protect the public from the potential problems cited by proponents of this legislation. If additional remedies are needed, strengthening and continuing enforcement of the provisions of existing laws and regulations would appear to provide a greater degree of protection to the public than the proposed legislation.

Criterion Five

Whether the practitioner performs a service for others which would qualify for payment of part or all of those services by a third party if the practitioner were to be regulated by the state.

Explanation of Criterion

Regulation of a profession is sometimes sought by practitioners for the purpose of facilitating access to third-party and governmental reimbursement sources. Criterion Five seeks to determine if regulation would allow third-party payments, and if so, whether such payments would provide a relative benefit to the public.

Commission's Research

The Commission identified two possible sources of reimbursement for services rendered in the cleanup of groundwater for which professionals may be directly reimbursed. The first is the federal Superfund or the Comprehensive Environmental Response, Compensation, and Liability Act, which funds cleanup of groundwater contamination caused by inactive waste sites, accidental chemical releases, or other threatening situations involving hazardous substances. The second fund, the SUPERB fund, was established to protect the State's surface and ground water from spills, leaks, and other discharges from underground petroleum storage systems, which pose a threat to the quality of ground and surface waters of South Carolina.

The Superfund program has provisions which allow the owner or operator of a hazardous waste site or a contractor hired by the owner or operator to cleanup the site to be directly reimbursed. Additionally, the Department of Health and Environmental Control can directly contract with a firm for the remediation of a hazardous waste site. Typically, the firms will include engineers, geologists, hydrologists, biologists, chemists, etc. which are necessary for the project. Reimbursement for work performed are made to the firm or contractor, or may be made to the owner/operator of the site. Payments are not made to the individual professionals.

The SUPERB fund will reimburse for work performed, which may include the contractor or firm responsible for specific projects or individual professionals who provide services. Although, the Department of Health and Environmental Control has not established written guidelines or criteria through regulation, an official stated that all types of work are reimbursed, including work performed by non-licensed professions, tasks such as removal of old tanks and the digging of holes, and work of a hydrologic nature. However, with existing laws and regulations governing engineers and geologists, the work performed by a "hydrologist" would be encompassed by these

professionals. According to an official of DHEC, criteria for this fund will be open for public comments at the end of July 1993.

Proponent's Response

The proposed legislation would license those qualified in the field of hydrology to receive payment for those services performed for others in the field of hydrology.

The licensing of those qualified to practice in the field of hydrology would provide assurance to the public that those practicing have credentials, experience, and knowledge in the field of hydrology.

Commission's Conclusion

The State Reorganization Commission concludes that State regulation of hydrologists would not immediately qualify hydrologists for third-party reimbursement.

According to officials with the Department of Health and Environmental Control, hydrologists would not qualify for reimbursement under Superfund, since an engineer is required to oversee the required work. Additionally, hydrologic work, not encompassed within the scope of practice for engineers and geologists, would be reimbursed at the rates established for engineers and geologists under the SUPERB fund. However, if hydrologists were recognized by the State, the guidelines for SUPERB fund would need to be amended to include a reimbursement rate for work performed by a professional hydrologist.

Criterion Six

Whether regulation will increase the cost of goods.

Explanation of Criterion

Criterion Six seeks to determine whether regulation of the profession would, in itself, result in unnecessarily high prices for goods and services offered by practitioners. Regulation that increases entry barriers into a profession may increase wage costs and prices to the public.

Commission's Research

The Commission evaluated the costs to the State to regulate hydrologists. The Commission also sought evidence to indicate whether the proposed regulation would regulate the prices charged by hydrologists, limit competition, impose unreasonable barriers to entry into the profession, or otherwise affect the costs of hydrological services. The cost of hydrological services is closely related to the supply of services available. The impact of regulation on the supply of hydrologists is discussed in greater detail under Criterion Seven, page 46.

Cost to Administer Regulation

Although not stated in the proposed legislation, South Carolina professional and occupational licensing boards generally are required, under the Appropriations Act, to recover 110 percent of their appropriation through fees assessed on applicants. Beginning in FY 1993-94, these licensing boards will be required to recover 110 percent of their expenditures. A fiscal impact statement prepared by the Budget Division of the Budget and Control Board, based on 150 to 300 licensees, estimates that the minimum initial cost to establish the Board of Registration for Hydrologists would be $31,764. This cost would cover the per diem and travel for the Board, the hiring of an initial employee, and operating costs associated with issuing licenses to qualified applicants. The statement projects subsequent annual costs of $51,764. An amount in excess of these costs would have to be recouped through application, examination, and certification fees imposed on hydrologists.

The proposed legislation does not specify what examination would be required of applicants. However, a representative from the American Institute of Hydrology stated that the Institute has a system of tests for hydrologists-in-training and for professional hydrologists that could be given and administered by the State Board of Registration for Hydrologists. The proposed board would have to cover the costs of contracting with the American Institute of Hydrology for the examinations themselves, and possibly the grading of these examinations. The current costs for the AIH's examinations are $100 and $150 for Part I and II, respectively.

The proposed legislation does not include any provisions for initial licensing fees, but provides the board the authority to promulgate fees through regulation. The proponents did not provide an estimate of the costs of administering this program.

During the public hearing, the representative for the Board of Registration for Geologists testified that their Board opposed the bill for several reasons, primarily because the legislation will cost taxpayers more than the value the public would receive from the creation of the board. He estimated the number of potential licensees in South Carolina to be between 50 and 100. Also, the State Board of Registration for Professional Engineers and Land Surveyors, in its response to the complaint survey, stated that there would not be a sufficient number of people who call themselves hydrologists, and who might be eligible for registration, to carry the financial burden of administering and enforcing the responsibilities of a registration board. Additionally, if the resources are not available for an effective administration, the creation of such a board would be a disservice to the public. The most effective safeguards for the public with respect to the matter of hydrologists are through existing channels of registration offered through the boards of engineering and geology. Both boards expressed concerns relating to the increase in costs for licensure to individuals practicing in this area, since many licensees would be required to hold two, and in some instances, three licenses.

Impact of Proposed Regulation on Costs

Currently, there are no laws in South Carolina which require the licensure of hydrologists. The proposed legislation would require individuals presently licensed as professional engineers and geologists to be licensed also as a professional hydrologist, if they intend to engage in the public practice of hydrology. In essence, a new tier of licensure would be created. During the grandfathering period, some of the currently licensed engineers and geologists, as well as qualified non-licensed individuals, could be licensed as either a hydrologist or a hydrologist-in-training. The Commission was unable to obtain actual figures as to the number of engineers and geologists who would qualify for licensure, but with an estimated number of potential licensees of between 150 and 300, it may be surmised that a significant proportion of the over 9,700 licensed professional engineers and over 770 licensed professional geologists would be excluded from practice. The proponents have stated that some currently licensed engineers and geologists would not qualify for licensure as a hydrologist, and that "*it would exclude self-proclaimed hydrologists from practice* and would allow those qualified as hydrologists to be registered as hydrologists." Further, the proponents contend that regulation should have little impact on the cost of hydrologic services because, "even with regulation, there will be healthy competition for work among the pool of qualified hydrologists." However, a reduction in the number of individuals available to provide hydrology-related services may result in higher prices.

Another consideration relating to the supply of practitioners is the availability of educational opportunities. The proposed legislation would require graduation in a board approved hydrologic or related science curriculum of four or more years. The proposed bill does not specify what would be considered a related science curriculum.

In South Carolina, no university or college currently offers a degree in hydrology. Therefore, individuals attending school in this state would have to meet licensure requirements through a related science curriculum. According to testimony received from both proponents and opponents, hydrologic education would have to be obtained through the engineering and geology curriculums. However, if universities and colleges in South Carolina implement a degree program in hydrology, the costs for this could ultimately be passed on to the taxpayers. Another requirement of licensure would be a five-year internship under the supervision of a licensed hydrologist. The extent to which this experience requirement would have an anti-competitive impact would be related to the number of available internship opportunities, and whether the time required for such an internship is reasonable related to the applicant's competence as a hydrologist.

Further, the Department of Health and Environmental Control which oversees many of the State's laws which provide oversight and enforcement for our water resources, stated that the plans/reports required which would address only hydrology are very rare. Therefore, the Commission must surmise that the new category of license would result in engineers and geologists (who do not qualify for licensure as a hydrologists) hiring a licensed hydrologist to perform some of the field work necessary in developing an overall plan or design. Creation of this license could then add to the cost of completing a project. For projects involving the cleanup of a hazardous waste site, which on average costs $25 million and takes about ten years, an increase in the costs of services may or may not be significant.

Proponent's Response

Regulation of the practice of hydrology should not increase the cost of goods (services).

The intent of the proposed legislation is to make qualified hydrologists available to the general public. It would exclude self-proclaimed hydrologists from practice and would allow those qualified as hydrologists to be registered as hydrologists. Regulation should have little impact on the cost of hydrologic services because, even with regulation, there will be healthy competition for work among the pool of qualified hydrologists.

Commission's Conclusion

The State Reorganization Commission could not conclusively determine whether regulation of hydrologists would increase or decrease the cost of goods and services.

Creation of licensure for hydrologists could increase the cost of services. First, the practitioner pool could be reduced if licensure is mandated of engineers and geologists currently practicing hydrology. Opponents have testified that not all licensed, practicing individuals will qualify for licensure. Additionally, if documents needed by existing statutes require that they be signed by a licensed engineer or geologist, the practitioners,

who do not qualify for licensure, would be forced to hire a hydrologist to perform the hydrology aspects of projects. Both the creation of multiple licenses and a new tier of licensees could result in an increase in the costs of services.

Further, with the requirement that professional and occupational licensing boards generate revenues to offset 110 percent of expenditures, licensed hydrologists would be forced to bear the costs of administering this program. It is likely that these costs would be passed on to the public in the form of higher prices. However, without regulation, the Commission cannot determine whether or not the cost of hydrological services would increase.

Criterion Seven

Whether regulation will increase or decrease the availability of services to the public.

Explanation of Criterion

Criterion Seven seeks to determine whether regulation will adversely affect the supply of regulated providers, or the demand among purchasers of services. Evidence should include any statutory or regulatory requirements that ***mandate*** *the use of professional services. Evidence should also address the potential impact of regulation on: (a) the number of qualified practitioners, and (b) the concentration of practitioners in locations throughout the state.*

Commission's Research

According the South Carolina Employment Security Commission, between 1986 and 2000, 210 new jobs are predicted for geologists, geophysicists, and oceanographers (hydrologists are included within this category). According to the United States Department of Labor, environmental protection and regulatory geoscience are becoming important fields of work for geoscientists with appropriate training. Particularly, jobs requiring training in hydrology and geochemistry should be in demand.

The Commission can draw only very rough conclusions regarding the effect of regulation on hydrologists, since no figures were available from State or federal government concerning the number of employed hydrologists or projections as to the future employment of hydrologists. Additionally, since no other state regulates hydrologists, figures for comparison were not available from this source. However, a simple comparison illustrates a significant difference between the number of potential licensees, estimated at between 150 and 300 and currently licensed engineers and geologists, who may now practice hydrology, totalling over 10,500.

Proponent's Response

Registration could decrease the availability of services to the public in that it will eliminate those not qualified to practice in the field of hydrology. However, it would allow those qualified to practice in the field of hydrology but presently are excluded. There should be an ample pool of qualified professionals to meet the needs of the people of this state. If this legislation is adopted, it is estimated that between 150 and 300 individuals within the State of South Carolina would qualify and register as professional hydrologists.

The proposed legislation will enable practitioners who are not presently registered in other professions and who are qualified to practice hydrology to be licensed and

registered as hydrologists. Currently, because of the interdisciplinary nature of hydrology, qualified practitioners are being disqualified from independently practicing hydrology through policies established by other licensing boards that prevent their being registered exclusively in the other disciplines.

Regulations promulgated by the United States Environmental Protection Agency under the Resource Conservation and Recovery Act (RCRA) for the management of solid and hazardous wastes, clearly recognize the need for qualified professionals who understand the hydrology of water under the ground. More importantly, registration will broaden the field in many respects. For example, a qualified practitioner in the field of bioremediation--the clean-up of waste by microbes that requires a fundamental understanding of hydrology, biology, chemistry, geology, and engineering--would be able to register and practice as a hydrologist. Other tasks that require the expertise of a hydrologist include computation of streamflow and aquifer hydraulic characteristics, site characterizations for impoundments and construction of industrial and waste water storage and processing facilities, and delineation of flood plains.

Commission's Conclusion

The State Reorganization Commission concludes that regulation of hydrologists may decrease the availability of services.

State regulation should not deprive any person the use of a title, or from entering into a profession, unless there is an overwhelming need to protect the public interest. Since there is no evidence that the public is being harmed by the non-regulated practice of hydrologists or that inferior quality is being provided by licensed engineers and geologists, the potential negative effects of any decrease in competition outweigh the potential benefits to the public. The State should strive to enhance the supply of practitioners through the encouragement of an inclusive approach to recognizing qualified professionals, as opposed to diminishing the supply of qualified professionals. Perhaps one opponent to the proposed legislation described the Commission's position best, when he stated:

> In my opinion these programs for professional exclusion do not serve the public interest well. And interestingly, the proposed legislation may exacerbate the problem by simply adding another special area of exclusion, with all the additive trappings of bureaucracy and taxpayer costs that would be required to administer another professional registration program. Further, if we can justify a program of registration for professional hydrologists, then what about geochemists, geophysicists, risk assessment specialists, environmental chemists, soil physicists, site remediation specialists, or any of the other numerous niche fields that have an important role in our present society's environmental assessment and restoration needs? I think fragmentation and close-minded turf-fighting would create a morass of bureaucracy and would certainly not be in the best interest of the public.

Criterion Eight

Whether regulation will assure the competency of practitioners of the occupation.

Explanation of Criterion

Criterion Eight seeks to determine whether regulation of the profession is commensurate with the degree of harm documented, and whether regulation would be a continuing and effective remedy to the problems identified. While Criterion Seven examined the impact of regulation on the ***quantity*** *of services available, this criterion focuses on regulation's impact on the* ***quality*** *of those services, and the degree to which State regulation will assure a practitioner's initial and continuing competency.*

Commission's Research

Defining Competent Hydrological Practice

Proponents for the regulation of hydrologists contend that incompetent practitioners pose a threat to the public's health, safety, and welfare--specifically, that a truly multidisciplined approach to water resources solutions, like that encompassed by hydrologists, is necessary to protect the public's health, safety, and welfare. The proposed legislation would establish a system of licensure for individuals engaged in the public practice of hydrology. This would be accomplished through ensuring that a minimum competency is acquired through education, experience, and examination requirements stipulated in the bill.

One study of occupational regulation suggests that regulation is ineffective when a profession "lacks a clearly defined field of practice and lacks a consensus on appropriate standards of practice" (Hogan 1983). The scope of practice for hydrologists appears to overlap with two professions licensed in South Carolina--engineers and geologists. In fact, both the proposed language for hydrologists and existing statutes for geologists define hydrologist and geologist as "a person with special knowledge of **geology, hydrology,** geophysics, and related earth sciences." [Emphasis added.] The two definitions differ in that geologists must apply these principles and methods to geological analysis, while a hydrologist would apply these principles and methods to hydrological analysis. Specifically, the public practice of hydrology as defined by the proposed bill would be regulated. The public practice of hydrology is defined as engaging in hydrological service of work in the nature of consultation, investigation, surveys, evaluations, planning, mapping, and inspection of hydrologic work required for or supporting compliance with municipal, county, state, or federal regulations.

Much of the testimony received by the Commission during its review centered on the duplication of effort which would result from the creation of a board of

registration for hydrologists. Already, today, overlap exists between the practices of engineers and geologists, resulting in the formation of a joint committee to work out scope of practice problems between these professions. Membership on the joint committee includes a representative from each board, a representative from the Department of Health and Environmental Control, and a representative from the professional societies representing each profession.

Establishing Initial Competency

The Commission analyzed the provisions of the proposed regulation to determine the extent to which it would assure initial competency of licensees.

Scope of Regulation. The proposed bill would limit the "public practice of hydrology" to individuals licensed by the board. The proposed legislation considers the public practice of hydrology to include the performance of hydrological service or work in the nature of consultation, investigation, surveys, evaluations, planning, mapping, and inspection of hydrologic work required for or supporting compliance with municipal, county, state, or federal regulations. The bill excludes the performance of the work performed by licensed engineers as provided in Chapter 22, Title 40 of the South Carolina Code of Laws, 1976, as amended.

A representative from the Midlands Branch of the American Society of Civil Engineering, stated that his interpretation of the practice of public hydrology, when you exclude the work not ordinarily performed by engineers, to be regulation of a "pure science." He concluded that he was unaware of any area of hydrology which was not currently covered by either the Board of Registration for Professional Engineers and Land Surveyors or the Board of Registration for Geologists.

Grandfathering. Upon the effective date of the proposed bill, applicants who meet the education and experience requirements of the bill have one year to apply to the Board of Registration for Hydrologists for licensure as a "professional hydrologist" or "hydrologist-in-training" under the grandfathering provisions. Additionally, the board may waive the examination requirement for five years for professional hydrologists applicants, who were granted registration as a hydrologist-in-training during the initial one-year grandfathering period.

In addition to the above requirements, the proposed bill would authorize the board to grant a special waiver to individuals licensed by the Board of Registration for Professional Geologists as a geologist-in-training who practiced as a hydrologist before the effective date of this act and applied to the board within six months of the effective date. The waiver, which could be granted for no more than five years, must provide that a person practicing as a hydrologist on the effective date of the Act must be regarded, for purposes of their work, as a registered professional geologist until they have met the experience requirements of the proposed bill.

Grandfathering for specialty recognition would be allowed for professional hydrological work performed before the effective date of the act, which satisfies the qualification requirements of the bill and if it was performed under the supervision of a qualified hydrologist in the specialty for which the applicant is seeking registration. Further, the bill would allow specialty registration as an engineering hydrologist for work performed under the supervision of a registered civil engineer.

The proponents for the legislation stated that they would propose eliminating the waiver for geologist-in-training, as well as the grandfathering of specialty recognition.

Assurance of Minimum Qualifications. To be qualified for registration as a "hydrologist" one would have to meet one of the following education and experience requirements:

(1) have graduated in an approved hydrologic or related science curriculum of four or more years from a school or college approved by the board and furnish a specific record of an additional five years or more of full-time experience as a hydrologist-in-training in hydrologic work or at least five years of hydrologic work germane to public practice satisfactory to the board indicating that the applicant is competent to practice hydrology and has passed either the unassembled or written examinations required by the board. In counting years of experience, the board may give credit, not in excess of one year, for each graduate degree in hydrology; or,

(2) have graduated in hydrology or a related science curriculum approved by the board of four years or more in a school or college other than those approved by the board, furnish a specific record of eight years or more of experience on hydrologic work of a character satisfactory to the board indicating that the applicant is competent to practice hydrology, and must have passed a written or oral examination designed to show knowledge and skill approximating that attained through graduation in an approved four-year hydrologic curriculum, and pass the examinations required of applicants in item (1).

To be qualified for registration as a "hydrologist-in-training" one would have to meet one of the following education and experience requirements:

(1) graduation from an accredited hydrologic curriculum of four scholastic years or more from a school or college approved by the board and have passed a written examination required by the board; or,

(2) graduation in a hydrologic or a related science curriculum of four scholastic years or more from a school or college other than those

approved by the board in item (1) with a specific record of five years or more of experience in hydrological work of a character satisfactory to the board or passing written examinations in hydrologic subjects designed to show knowledge and skill approximately that attained through graduation in an approved hydrologic curriculum and passing the written examination as required in item (1).

The Commission found that no university in South Carolina offers a degree in hydrology. In fact, information provided by the American Institute of Hydrology indicated that only four schools in the United States offer hydrology programs; the following provides the names of these universities and the degrees offered:

- The University of Idaho, MS in Hydrology;
- Traleton State University in Texas, BS in Hydrology;
- University of Arizona, BS, MS, and PhD in Hydrology;
- University of Nevada, MS and PhD in Hydrology and Hydrogeology.

In addition, the Universities of Florida and Colorado are in the process of establishing graduate programs in Hydrologic Sciences. A July 1991 Bulletin from the American Institute of Hydrology provided a list of colleges and universities that offer curricula in hydrology and/or hydrogeology sufficient to meet the basic Institute requirements for certification. The majority of programs approved by the Institute included programs in engineering and geology. Other programs included earth sciences, environmental sciences, forestry, and chemistry.

Proponents of the legislation and the Water Resources Commission have stated that university support of the hydrologic science is emerging, but remains meager and acknowledge that the hydrology curriculum is spread between the engineering and geology schools. They contend that enactment of the proposed bill would show support for emerging university programs in formalizing the science of hydrology and would encourage students to enter the programs.

The proponents for the bill testified during the public hearing that individuals with degrees in engineering and geology, along with practical experience in hydrology, would in fact be qualified to practice. The proponents contend that experience is the key to becoming qualified to practice hydrology and this would be gained during the five-year intern period as a hydrologist-in-training required prior to licensure. Likewise, the opponents contend that the licensure of engineers and geologists in the State along with the required experience provided South Carolinians with the needed protection without the need for further regulation.

Assuring Continued Competency

Continuing Education Requirements. The proposed bill contains no provisions for continuing education.

Complaints and Disciplinary Actions. The board would be authorized to revoke the registration of a licensee who:

- had been declared insane by a court of competent jurisdiction and had not been lawfully declared sane; or,
- had been found guilty of: the practice of fraud or deceit in obtaining registration; gross negligence, incompetency, or misconduct in the practice of hydrology; a felony or crime involving moral turpitude; aiding or abetting a person in violating this chapter; or, violating this chapter.

The board would be empowered to reinstate the certificate of registration of a person whose certification had been revoked or lapsed if three or more board members voted in favor of reissuance.

A person would be considered guilty of a misdemeanor who:

- practiced or offered to practice public hydrology in this State without being registered in accordance with this chapter;
- presented or attempted to use as his own the certificate of registration or the seal of another registrant;
- provided false or forged evidence of any kind to the board or to a member in obtaining registration;
- falsely impersonated another registrant;
- attempted to use an expired or revoked certificate of registration; or,
- violated this chapter in any other way.

Upon conviction, a person could be fined an amount not less than one hundred dollars and not more than five hundred dollars or imprisoned for not more than three months, or both.

Proponent's Response

The regulation will assure the competency of practitioners of the occupation.

The intent of the proposed regulation is to establish standards and procedures to examine qualifications, credentials, and experience of individuals who seek registration in the field of hydrology.

The proposed legislation will provide the establishment and maintenance of ethical standards to protect the public from irresponsible work. It will provide and encourage education and training in hydrology and it will provide the public advice and guidance concerning activities related to the hydrologic profession.

Commission's Conclusion

The State Reorganization Commission concludes that Criterion Eight is not met. The proposed legislation does not clearly define the field of practice for hydrologists.

From testimony presented and received by the Commission, clearly the scope of practice for engineers and geologists overlaps, and would be further complicated with the licensure of hydrologists. The statutes do not clearly define what tasks could be performed by a hydrologist. Additionally, ideally registrants would have a degree in hydrology, but since this is not available in South Carolina, individuals attending school in this State would be required to graduate in a "related science curriculum" relying largely upon the engineering and geology programs offered. If these courses are sufficient in meeting the educational requirements, then the Commission presumes that the engineers and geologists should meet a minimum level of educational competency. The proponents of the proposed legislation contend that much of the competency to practice hydrology is obtained through on-the-job training, and that the five-year internship provides this critical aspect in ensuring competency. Likewise, the opponents contend that many of licensed engineers and geologists practicing hydrology have been qualified through years of work in the area. Further, the Commission finds that existing mechanisms exist to ensure that only engineers and geologists who meet minimum competency are allowed to practice. Both boards have the authority to sanction licensees who engage in work outside of their area of competency.

The proponents of the legislation contend that the licensure of hydrologists would provide the impetus for increased course work relating to hydrology at the universities and colleges. However, the Commission concludes that licensure should not be used to justify new university and college programs.

Criterion Nine

Whether regulation can be provided through an existing state agency or under supervision of presently licensed practitioners.

Explanation of Criterion

Traditionally, the most common practice found in the states for administering occupational regulation, once enacted, has been an autonomous or semi-autonomous board made up of members of the regulated profession. Increasingly, however, states have moved towards placement of licensing boards within a common or central agency of state government in the interest of achieving greater administrative efficiency and public accountability. In fiscal year 1992, the combined appropriation of the State's thirty-one occupational licensing boards (as defined by §11-5-210) exceeded seven million dollars and employed approximately 170 individuals. While the administrative costs of these boards are required to be recovered through fees, occupational regulation is not without costs to licensees or the public. Sunrise Review provides a means by which policy-makers can assess the need for additional occupational licensing boards, prior to their being established.

Commission's Research

Proposed Means of Administering State Regulation

The proposed legislation would create a new state agency by establishing an independent five-member South Carolina Board of Registration for Hydrologists. The board would be composed of a lay member and four registered professional hydrologists of varied backgrounds, including an academic hydrologist, a salaried company hydrologist, an independent or consultant hydrologist, and a hydrologist from a state agency. Additionally, to qualify to serve as a hydrologist member of the board, one must have been engaged in the practice of hydrology for at least twelve years and in responsible charge of important hydrologic work for at least five years. All members would be appointed by the Governor for terms of five years. The board would function as an autonomous entity employing the necessary staff to carry out the provisions of the law.

The proposed legislation requires each applicant to take an examination or examination(s) as required by the board. Proponents have stated that they could contract with the American Institute of Hydrologists for the examinations it currently utilizes.

Additionally the board would receive complaints and take disciplinary action against licensed hydrologists and hydrologists-in-training.

During the public hearing, the representative for the Board of Registration for Geologists testified that their Board opposed the bill for several reasons, but the primary reason is that the legislation will cost taxpayers more than the value the public would receive from the creation of the board. He estimated the number of potential licensees in South Carolina to be between 50 and a 100, probably fewer. Also, the State Board of Registration for Professional Engineers and Land Surveyors, in its response to the complaint survey, stated that there would not be a sufficient number of people who call themselves hydrologists, and who might be eligible for registration, to carry the financial burden to administer and enforce the responsibilities of a registration board. In addition, if the resources are not available for an effective administration, the creation of such a board would be a disservice to the public. The most effective safeguards for the public with respect to the matter of hydrologists are through existing channels of registration offered through the boards of engineering and geology. The Board of Registration for Professional Engineers and Land Surveyors stated that creation of a new entity would not better serve the public and felt that it was unnecessary for some engineers to hold three licenses in order to continue their current scope of practice.

Proponents assert that no existing state agency regulates hydrologists in South Carolina and that regulation is needed to allow hydrologists to practice independently from engineers and geologists. Both the Board of Registration for Professional Engineers and Land Surveyors and the Board of Registration for Geologists regulate professions involved in water resources. Additionally, the Department of Health and Environmental Control and the State Water Resources Commission are critical entities in the oversight and regulation of the State's water resources.

Proponent's Response

There is no existing state agency or existing licensed practitioner in the field of hydrology in South Carolina. There are practitioners in the field of hydrology that are not necessarily qualified to practice as hydrologists but practice in the field of hydrology because of licenses in a related field. There are qualified professionals in the field of hydrology who have been informed through third parties that they cannot formally and independently practice hydrology and certify their work because of proclamations by existing licensing boards.

The proposed legislation would allow those practitioners that are qualified in the field of hydrology to be registered as hydrologists even if the credentials were obtained in a related field but would exclude those not qualified to practice hydrology even though they are qualified in a related field.

Commission's Conclusion

The Commission concludes that, should regulation of hydrologists be enacted, the administrative and oversight responsibilities should be placed with an existing state agency.

If regulation of hydrologists were to be enacted, the Commission contends that administration and oversight by an existing state agency would be more efficient than the creation of an autonomous board. The Commission does not have a specific recommendation regarding placement of hydrologist regulation, since it does not recommend regulation of this profession. However, either the Board of Registration for Professional Engineers and Land Surveyors or the Board of Registration for Geologists could assume this function. Alternatively, the Department of Health and Environmental Control could be charged with implementing and overseeing a registration program for hydrologists.

RECOMMENDATION

The State Reorganization Commission recommends that the General Assembly enact no regulation of hydrologists at this time.

The provisions of Act 572 of 1988 specify that the State Reorganization Commission must recommend no regulation unless regulation is necessary to protect the health, safety, or welfare of the public. Based on its evaluation applying the nine Sunrise criteria, and pursuant to its consideration of hearing testimony and other research and inquiries, the State Reorganization Commission concludes that the unregulated practice of hydrologists does not present a clear and recognizable danger to the public health, safety, or welfare. Therefore, in accordance with the provisions of the Sunrise Act, the Commission concludes that regulation of hydrologists is not in the public interest, and should not be enacted at this time.

As outlined in the body of this report, there was no documented evidence produced that unqualified hydrologists or the incompetent practice of hydrology are harming South Carolinians. The instances of harm cited by proponents are more effectively addressed by enforcement of existing legal remedies. For example, when the Water Resources Commission or the Department of Health and Environment Control encounter problems with the work performed by licensed professional engineers or geologists, the appropriate licensing board should be contacted so that an investigation can be conducted.

The Sunrise Act states that, in making its recommendations, the Commission may recommend that no regulation be created, that regulations should be assigned to an existing board or agency, or that a new board be established. If the Commission had determined that existing remedies did not adequately protect the public, the Sunrise Act requires the Commission to recommend the least restrictive form of regulation consistent with the public interest. The Sunrise statute ranks the degrees of occupational regulation to be considered, from the least restrictive to the most restrictive, as follows:

(1) statutory changes to provide for civil cause of action or criminal penalties;

(2) inspection of a practitioner's premises and activities and authorization of an appropriate state board, agency, or commission to enjoin an activity which is detrimental to the public health, safety, or welfare;

(3) listing of a practitioner's location, nature, and operation of practice;

(4) listing of those practitioners who meet predetermined qualifications and who are the only persons permitted to use an occupational title; or,

(5) listing of those practitioners who meet predetermined qualifications and who are the only persons permitted to use an occupational title to engage in an occupation to the exclusion of unlicensed persons.

The proposed regulation would enact a system of licensure, the most stringent form of occupational regulation, described under (5). However, the Commission recommends, in accordance with the provisions of the Sunrise Act, that no regulation of hydrologists be enacted at this time.

SUMMARY OF PROPOSED LEGISLATION

House Bill 3008

OCCUPATION UNDER REVIEW: *Hydrologists*

NATURE OF REGULATION: *Licensure (practice act)*

Definitions

House Bill 3008 would legally define the terms "board," "hydrology," and "registered professional hydrologist."

Board Structure and Function

The statute would establish the "State Board of Registration for Hydrologists." The proposed board would consist of five members: one lay member and four registered professional hydrologists including an academic hydrologist, a salaried company hydrologist, an independent or consultant hydrologist, and a hydrologist from a state agency. Additionally, the hydrologist members would be required to have been in the active practice of hydrology for at least twelve years and to have been in responsible charge of important hydrologic work for at least five years. The board members would be appointed by the Governor for a five-year term, with the initial terms being staggered. The board members would not be salaried, but would receive the usual per diem, mileage, and subsistence allowed by state law for members of boards, commissions, and committees. Board duties would include: meeting at least twice a year; electing officers; determining qualifications for licensees; determining areas of specialty, as well as the qualifications for each specialty; establishing application, examination, and reexamination requirements for licensure; and, adopting a seal of the board.

Licensing Requirements

Professional Hydrologist

To be eligible for licensure, an applicant would be required to satisfy one of the following:

- Graduation from an approved hydrologic or related science curriculum of four or more years from a school or college approved by the board; completion of five years or more full-time experience as a hydrologist-in-training in work germane to the public practice of hydrology; and, passage of either the unassembled or written examinations required by the board; or
- Graduation from an approved hydrologic or related science curriculum of four years or more from a school or college other than those approved by the board; experience of eight years or more on hydrologic work of a character satisfactory to the board; passage of a written or oral examination designed to show knowledge and skill approximately that attained through graduation in an approved four-year hydrologic curriculum; and, passage of either the unassembled or written examinations required by the board.

Hydrologists-in-Training

To be registered as a hydrologist-in-training, an applicant would be required to satisfy one of the following:

- Graduation from an accredited hydrologic curriculum of four scholastic years or more from a school approved by the board and passage of a written examination approved by the board; or
- Graduation from a hydrologic or related science curriculum of four scholastic years or more from a school or college other than those approved by the board; experience of five years or more of hydrological work of a character satisfactory to the board or passage of a written examination in hydrologic subjects designed to show knowledge or skill approximately that attained through graduation in an approved hydrologic curriculum; and, passage of a written examination approved by the board.

Specialty Registration

To be recognized in a specialty, an applicant would have to satisfy all the requirements for registration as a professional hydrologist; special requirements as set by the board in regulation, including passage of an examination in the specialty; and, five years of professional hydrologic work including one of the following:

- Minimum of three years' experience under the supervision of a registered professional hydrologist recognized in the specialty for which the applicant is seeking recognition; or
- Minimum of four years' experience in responsible charge of hydrologic work in the specialty for which the applicant is seeking recognition.

Exemptions

The proposed legislation would exempt:

- The practice of any other legally recognized profession or trade;
- The practice of a person who does not reside in or have a business in South Carolina but is registered in another state with comparable licensure requirements and has been granted a temporary permit by the board for a specific project and a definite period of time;
- The practice of a person who does not reside in or have a business in South Carolina but is registered in another state with comparable licensure requirements and has applied to the board for registration in South Carolina and has been granted a temporary permit to practice by the board;
- The work of an employee or subordinate of a person holding a temporary permit under the provisions of this chapter, if the work does not include final designs or decisions and is done under the direct supervision of a person holding the temporary permit;
- The practice of officers and employees of the federal government while engaged in the practice of hydrology for the federal government; and,
- The practice of teaching or research in hydrology in colleges or universities in this State, if the work is confined to those activities and is not the public practice of hydrology.

Scope of Practice Definitions

"Hydrologist," "hydrologist-in-training," and "responsible charge of work" are specifically defined within the proposed legislation. Additionally, engaging in the public practice of hydrology is defined as the performance of hydrological service or work in the nature of consultation, investigation, surveys, evaluations, planning, mapping, and inspection of hydrologic work required for or supporting compliance with municipal, county, state, or federal regulations. The practice of engineering is explicitly excluded.

Administrative Provisions

Board duties would include: promulgation of necessary regulations; employment of necessary clerical and other assistants; setting application, examination, reexamination, registration, and reregistration fees; reviewing the qualifications of licensees; issuing of certificates of registration; administration of examinations; disciplining licensees; maintaining a register of names and addresses of licensees and their license numbers; publishing an annual roster showing the names and places of business of all registered professional hydrologists; annual renewal of licenses; and, submitting an annual report to the Governor.

Examinations

To be licensed applicants would have to pass board required examinations. The proposed bill would authorize the board to administer an oral examination to an applicant who did not graduate from a board approved school or college in order to determine if the applicant had attained the knowledge and skill approximately of that attained through graduation in approved curriculum. A candidate who failed an examination two times would be required to provide evidence satisfactory to the board that the candidate had taken steps including additional schooling, classes, seminars, or self-study to better prepare for the third examination. A candidate who failed the examination three times would be required to submit a new application in order for the board to make a new determination as to whether or not the candidate had the necessary experience and other qualifications for admittance to further examination.

Reciprocity

The board would be authorized to grant a license to a person holding a license to practice hydrology in another state, territory or possession of the United States, the District of Columbia, or of a foreign country with comparable licensing requirements without further examination.

Continuing Education

House Bill 3008 contains no continuing education provision.

Grounds for Suspension, Revocation

The board would be authorized to revoke the registration of a licensee who:

- had been declared insane by a court of competent jurisdiction and had not been lawfully declared sane; or,

- had been found guilty of: the practice of fraud or deceit in obtaining registration; gross negligence, incompetency, or misconduct in the practice of hydrology; a felony or crime involving moral turpitude; aiding or abetting a person in violating this chapter; or, violating this chapter.

The board would be empowered to reinstate a certificate of registration of a person whose certification had been revoked or lapsed if three or more board members voted in favor of reissuance.

Penalties for Violating the Law

A person would be considered guilty of a misdemeanor who:

- practiced or offered to practice public hydrology in this State without being registered in accordance with this chapter;
- presented or attempted to use as his own the certificate of registration or the seal of another registrant;
- provided false or forged evidence of any kind to the board or to a member in obtaining registration;
- falsely impersonated another registrant;
- attempted to use an expired or revoked certificate of registration; or,
- violated this chapter in any other way.

Upon conviction, a person would be fined an amount not less than one hundred dollars and not more than five hundred dollars or imprisoned for not more than three months, or both.

A BILL

TO AMEND TITLE 40, CODE OF LAWS OF SOUTH CAROLINA, 1976, BY ADDING CHAPTER 80 SO AS TO ESTABLISH THE STATE BOARD OF REGISTRATION FOR HYDROLOGISTS, TO DEFINE ITS POWERS AND DUTIES, TO REGULATE THE PRACTICE OF HYDROLOGY, AND TO PROVIDE PENALTIES.

Be it enacted by the General Assembly of the State of South Carolina:

SECTION 1. Title 40 of the 1976 Code is amended by adding:

"CHAPTER 80

Hydrologists

Section 40-80-10. As used in this chapter:

(1) 'Board' means the State Board of Registration for Hydrologists.

(2) 'Hydrologist' means a person with special knowledge of the science of geology, hydrology, geophysics, and related earth sciences and principles and methods of hydrological analysis acquired by professional education and practical experience.

(3) 'Hydrologist-in-training' means a person who possesses the qualifications prescribed in Section 40-80-100 and who has been certified as a hydrologist-in-training.

(4) 'Hydrology' means an earth science that deals with the occurrence of water, its physical and chemical reaction with the rest of the earth, and its relation to life of the earth. It includes the study of the circulation of water from the sea to the atmosphere, from the atmosphere to the land, and the numerous routes over and under the surface of land back to the sea.

(5) 'Registered professional hydrologist' means a person who meets the requirements of this chapter and is registered as a professional hydrologist by the board.

(6) 'Responsible charge of work' means the independent control and direction by the use of initiative, skill, and independent judgment of hydrological work or the supervision of hydrological work. Responsible charge of hydrologic teaching or research may be construed as responsible charge of important hydrological work.

Section 40-80-20. There is created the State Board of Registration for Hydrologists which shall administer this chapter. The board consists of four registered professional hydrologists of varied hydrological backgrounds and one lay member who is not a hydrologist. At least one member of the board must be an academic hydrologist, one member must be a salaried company hydrologist, one member must be an independent or consultant hydrologist, and one member must be a hydrologist from a state agency. Each member must be appointed by the Governor for a term of five years and until a successor possessing the same qualifications is appointed and

qualifies. A vacancy on the board must be filled for the unexpired term in the same manner as the original appointment.

Section 40-80-30. A hydrologist member of the board must have been engaged in the practice of hydrology for at least twelve years and must have been in responsible charge of important hydrologic work for at least five years. Responsible charge of hydrologic teaching or research may be construed as responsible charge of important hydrologic work.

Section 40-8-40. The board shall hold at least two regular meetings each year. Special meetings may be held at times as the bylaws of the board may provide. The board shall elect annually a chairman, vice-chairman, and a secretary. A quorum of the board consists of three members. Members of the board shall receive per diem, subsistence, and mileage provided by law for members of state boards, committees, and commissions when actually attending to the work of the board.

Section 40-8-50. The board may promulgate regulations for the administration and enforcement of this chapter and shall adopt an official seal.

Section 40-80-60. The board may employ clerical and other assistants necessary for the proper performance of its work and make expenditures for any purpose it considers necessary for performing its duties.

Section 40-80-70. (A) For the purposes of this chapter a person is engaged in the public practice of hydrology when performing hydrological service or work in the nature of consultation, investigation, surveys, evaluations, planning, mapping, and inspection of hydrologic work required for or supporting compliance with municipal, county, state, or federal regulations. This definition does not include or allow the practice of engineering as defined in Chapter 21, Title 40. A person is considered to practice or offer to practice hydrology within the meaning and intent of this chapter who:

(1) practices in any branch of the profession of hydrology;

(2) by verbal claim, sign, advertisement, letterhead, card, or in any other way represents to be a registered professional hydrologist or through the use of some other title implies that the person is a professional hydrologist; or

(3) holds out as able to perform or does perform hydrological service or work or any other professional service designated by the practitioner or recognized by educational authorities as hydrology.

(B) The practice of hydrology does not include the work ordinarily performed by persons who practice engineering as defined in Chapter 21, Title 40.

Section 40-80-80. In order to safeguard life, health, and property and to promote the public welfare, a person engaged in the public practice of hydrology or offering to engage in the public practice of hydrology is required to submit evidence that the person is qualified to practice and must be registered. It is unlawful for a person to offer or engage in the public practice of hydrology in this State or to use in connection with the person's name or otherwise assume, use, or advertise any title or description tending to convey the impression that the person is a registered professional hydrologist, unless the person is registered under this chapter.

Section 40-80-90. To be registered as a professional hydrologist, a person must:

(1) have graduated in an approved hydrologic or related science curriculum of four or more years from a school or college approved by the board and furnish a specific record of an additional five years or more of full-time experience as a hydrologist-in-training in hydrologic work or at least five years of hydrologic work germane to public practice satisfactory to the board indicating that the applicant is competent to practice hydrology and have passed the either unassembled or written examinations required by the board. In counting years of experience the board may give credit, not in excess of one year, for each graduate degree in hydrology; or

(2) have graduated in hydrology or a related science curriculum approved by the board of four years or more in a school or college other than those approved by the board, furnish a specific record of eight years or more of experience on hydrologic work of a character satisfactory to the board indicating that the applicant is competent to practice hydrology, and must have passed a written or oral examination designed to show knowledge and skill approximating that attained through graduation in an approved four-year hydrologic curriculum, and pass the examinations required of applicants in item (1).

Section 40-80-100. The minimum evidence that an applicant is qualified for registration as a hydrologist-in-training is:

(1) graduation from an accredited hydrologic curriculum of four scholastic years or more from a school or college approved by the board and passing a written examination required by the board; or

(2) graduation in a hydrologic or a related science curriculum of four scholastic years or more from a school or college other than those approved by the board in item (1) with a specific record of five years or more of experience in hydrological work of a character satisfactory to the board or passing written examinations in hydrologic subjects designed to show knowledge and skill approximately that attained through graduation in an approved hydrologic curriculum and passing the written examination as required in item (1).

Section 40-80-110. (A) In addition to registering as a professional hydrologist, a person may be eligible for recognition in a specialty. Specialties may be established by the board by regulation, with the regulations containing any required additional qualifications. An application may be submitted for registration as a professional hydrologist and for recognition in a specialty at the same time, but the applicant must be approved for registration as a professional hydrologist before being approved for recognition in a specialty.

(B) An applicant for recognition in a specialty shall meet all of the requirements of a registered professional hydrologist and special requirements as the board may establish by regulation, which must include passing an examination in the specialty and the five years of professional hydrological work must include one of the following:

(1) a minimum of three years' experience under the supervision of a registered professional hydrologist and recognized in the specialty for which the person is seeking recognition;

(2) a minimum of four years' experience in responsible charge of hydrologic work in the specialty for which the applicant is seeking recognition.

Section 40-80-120. Examinations must be conducted by the board at times and places the board determines but must be held at least annually.

Section 40-80-130. In considering the qualifications of applicants, full-time hydrologic teaching at the university level or research work may be considered as hydrologic work experience.

Section 40-80-140. A person having the necessary qualifications prescribed in this chapter is eligible for registration although the person may not be practicing the profession at the time of making application.

Section 40-80-150. A person holding a license to practice hydrology, based on comparable licensing requirements of a state, territory or possession of the United States, the District of Columbia, or of a foreign country and who, in the opinion of the board, otherwise meets the requirements of this chapter, upon application and payment of applicant fees, may be licensed without further examination.

Section 40-80-160. An application for registration must be on forms furnished by the board containing statements showing under oath the applicant's education and a detailed summary of the applicant's technical work and other relevant information.

Section 40-80-170. (A) The board by regulation shall establish application, examination, reexamination, registration, and reregistration fees which must be paid at the time of each application or reapplication.

(B) If the board denies the issuance of a certificate of registration to an applicant the initial fee deposited must be retained as an application fee. A registration fee must be collected before issuance of a certificate of registration to a qualified applicant.

Section 40-80-180. When an examination is required on fundamental hydrological subjects ordinarily given in college curricula, the applicant may take that part of the examination before completion of the requisite years of scholastic studies in hydrology. The examination must be prepared and conducted as prescribed by the board with special reference to the applicant's ability to ensure the safety of life, health, and property.

Section 40-80-190. The board shall issue a certificate of registration, upon payment of the registration fee, to an applicant who has satisfactorily met all the requirements of this chapter. For a registered professional hydrologist, the certificate must authorize the practice of hydrology. For a hydrologist-in-training, the certificate must state that the applicant has completed the scholastic requirements, has successfully passed the examination in fundamental, hydrological subjects required by the board, and has been enrolled as a hydrologist-in-training. The certificates must show the full name of the registrant, have a serial number, and must be signed by the chairman and the secretary of the board under seal of the board.

Section 40-80-200. A candidate failing an examination may apply for reexamination at the next examination date and must be reexamined with payment of an additional fee sufficient to cover the cost of reexamination. A candidate for registration who has failed the same topical examination two times shall provide evidence satisfactory to the board that the candidate has taken steps including, but not limited to, additional schooling, classes, seminars, or self-study to better prepare for a third examination on the same topical subject. A new application is required of a candidate having failed the same topical examination three times for a new determination by the board as to whether the candidate has the necessary experience and other qualifications for admittance to further examination.

Section 40-80-210. The issuance of a certificate of registration by the board is prima facie evidence that the person named is entitled to all the rights and privileges of a registered professional hydrologist while the certificate remains valid.

Section 40-80-220. Upon registration a person shall obtain a seal of the design authorized by the board, bearing the registrant's name, number, and the title 'registered professional hydrologist'. All drawings, reports, or other hydrologic papers or documents involving hydrologic work as defined in this chapter which have been prepared or approved by a registered professional hydrologist or a subordinate employee under the direction of a registered professional hydrologist for the use of or delivery to any person or for public record within this State must be signed by the registered professional hydrologist and impressed with the registered professional hydrologist's seal or, in the case of a nonresident hydrologist practicing pursuant to this chapter, then the seal of the nonresident hydrologist.

Section 40-80-230. A registered professional hydrologist who decides to continue the practice of this profession, annually during the month of June upon payment of the prescribed fee, must be issued a renewal registration card for the ensuing registration year.

Section 40-80-240. The board may revoke the registration of a hydrologist who:

(1) has been declared insane by a court of competent jurisdiction and has not been lawfully declared sane; or

(2) who is found guilty of:

(a) the practice of fraud or deceit in obtaining registration;

(b) gross negligence, incompetency, or misconduct in the practice of hydrology as a registered professional hydrologist;

(c) a felony or crime involving moral turpitude;

(d) aiding or abetting a person in violating this chapter; or

(e) violating this chapter.

Section 40-80-250. A person may bring charges of fraud, deceit, gross negligence, incompetency, or misconduct against a registrant. The charges must be in writing and be sworn to by the person making them and filed with the secretary of the board. All charges, unless dismissed by the board as unfounded or trivial, must be heard as provided by the Administrative Procedures Act.

Section 40-80-260. A person whose registration is denied or revoked by the board may appeal under the Administrative Procedures Act.

Section 40-80-270. The board may reissue a certificate of registration to a person whose registration has lapsed or has been revoked if three or more members of the board vote in favor of reissuance. A new certificate of registration to replace a certificate revoked, lost, destroyed, or mutilated may be issued, subject to the regulation of the board, and payment of a fee determined by the board. If registration has been revoked for any reason, the hydrologist must reapply for registration.

Section 40-80-280. In carrying out this chapter, the board may subpoena witnesses and compel their attendance and also may require the production of books, papers, reports, documents, and similar material in a case involving practicing or offering to practice without registration. Any member of the board may administer an oath or affirmation to a witness appearing before the board. If a person refuses to obey a subpoena or refuses to testify or produce books, papers, reports, documents, or similar material, the board may petition the circuit court to issue a subpoena requiring the attendance of the person to testify or to produce books, papers, reports, documents, or similar material considered necessary and pertinent by the board.

A person failing or refusing to obey a subpoena or order of the court may be subject to legal proceedings.

Section 40-80-290. (A) The board shall keep a record of its proceedings and these records are prima facie evidence of the proceedings of the board and a transcript of them, certified by the secretary, is admissible in evidence with the same force and effect as the original.

(B) The board shall maintain a register of all applications for registration showing:

(a) the name, age, and residence of each applicant;

(b) the date of the application;

(c) the place of business of the applicant;

(d) the applicant's educational and other qualifications;

(e) whether or not an examination was required;

(f) whether the applicant was rejected;

(g) whether a certificate of registration was granted;

(h) the date of the action of the board; and

(i) other information considered necessary by the board.

(C) A roster showing the names and places of business of all registered professional hydrologists must be published during the month of August of each year. Copies of this roster must be mailed to each person registered, placed on file with the Secretary of State, and furnished to the public upon request.

Section 40-80-300. Annually, on or before June thirtieth, the board shall submit to the Governor a report of its transactions of the preceding year and a complete statement of the receipts and expenditures of the board, attested to by the chairman and the secretary.

Section 40-80-310. (A) A person is guilty of a misdemeanor who:

(1) practices or offers to practice public hydrology in this State without being registered in accordance with this chapter;

(2) presents or attempts to use as his own the certificate of registration or the seal of another;

(3) gives false or forged evidence of any kind to the board or to a member in obtaining registration;

(4) falsely impersonates another registrant;

(5) attempts to use an expired or revoked certificate of registration; or

(6) violates this chapter in any other way.

(B) Upon conviction, a person must be fined not less than one hundred dollars and not more than five hundred dollars or imprisoned for not more than three months, or both.

Section 40-80-320. To enforce this chapter or restrain a violation of this chapter, the board may apply in the name of the State for an injunction as provided generally in civil cases. In the proceedings: (a) it is not necessary to establish the absence of an adequate remedy at law; (b) the board members are not liable personally for damages resulting from a wrongful injunction; and (c) the initial order of injunction must include a rule to show cause and is temporary pending the return to the rule.

Section 40-80-330. The Attorney General shall act as legal advisor to the board and render legal assistance necessary in carrying out this chapter.

Section 40-80-340. This chapter may not be construed to prevent or to affect:

(1) the practice of any other legally recognized profession or trade;

(2) the practice of a person not a resident of and having no established place of business in this State, practicing or offering to practice hydrology in this State, when the practice does not exceed in the aggregate more than thirty days in any calendar year, if the person is legally qualified by registration to practice the profession in the person's own state or country and the requirements and qualifications for obtaining registration are not lower than those specified in this chapter. The person shall apply to the board in writing and after payment of a fee established by the board may be granted a written permit for a definite period of time to do a specific job; but no right to practice hydrology accrues to the applicant with respect to any other work not set forth in the permit;

(3) the practice of a person not a resident of and having no established place of business in this State or who recently has become a resident of this State, practicing or offering to practice hydrology in this State for more than thirty days in any calendar year if the person files with the board an application for registration and has paid the fee required, when the person is legally qualified by registration to practice hydrology in the person's own state or country and the requirements and qualifications for obtaining registration are not lower than those specified in this chapter, and the practice may continue only for such time as the board requires for the consideration of the application for registration;

(4) the work of an employee or a subordinate of a person holding a certificate of registration under this chapter or an employee of a person practicing lawfully under item (2) or (3), if the work does not include final designs or decisions and is done under the direct responsibility, checking, and supervision of a person holding a certificate of registration under this chapter or a person practicing lawfully under item (2) or (3);

(5) the practice of officers and employees of the federal government while engaged within this State in the practice of hydrology for the federal government;

(6) the practice of teaching or research in hydrology in colleges or universities in this State, if the work is confined to those activities and is not the public practice of hydrology pursuant to this chapter."

SECTION 2. Of the members of the State Board of Registration for Hydrologists first appointed, one of the hydrologists shall serve for five years, one shall serve for four years, one shall serve three years, and one shall serve two years. The lay member shall serve for one year. These initial terms begin running when all members of the board have been appointed. The members of the initial board, except the lay member, must be qualified for registration at the time of their appointment.

SECTION 3. (A) For one year after the effective date of this act the State Board of Registration for Hydrologists may waive the examinations required to become a registered professional hydrologist or hydrologist-in-training if the applicant for registration meets the scholastic and experience requirements provided for in this chapter.

(B) For five years after the effective date of this act the board may waive the examinations required to become a registered professional hydrologist if the applicant applied for and was granted registration as a hydrologist-in-training within one year of the effective date of this act.

(C) Within six months after the effective date of this act the board shall grant a special waiver for the public practice of hydrology pursuant to Chapter 80, Title 40, as added by Section 1 of this act, not to exceed five years, to a qualified geologist-in-training who practiced as a hydrologist before the effective date of this act. The waiver must provide that a person practicing as a hydrologist on the effective date of this act must be regarded, for purposes of

their work, as a registered professional geologist until they have met the experience requirements of this chapter.

SECTION 4. Professional hydrological work performed before the effective date of this act satisfies the qualification requirements of Section 40-80-110(B)(1), as added by Section 1 of this act, if it was performed under the supervision of a qualified hydrologist in the specialty for which the applicant is seeking registration or under the supervision of a registered civil engineer if the applicant is seeking registration as an engineering hydrologist.

SECTION 5. This act takes effect upon approval by the Governor.

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