

A Career as a Professional Geologist

presented by

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PCPG President**

and

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PCPG Outreach Chair/Board Member**



Indiana University of Pennsylvania
October 29, 2021

A little bit about Us...

Barb

- BS in Geology from IUP
- PG in Pennsylvania and CPG
- Worked for Consultants, Industry and PA DEP
- Primarily in Energy – Coal & Natural Gas
- Coal Exploration, Permitting, & Data Analysis
- Environmental & Geotechnical Investigations



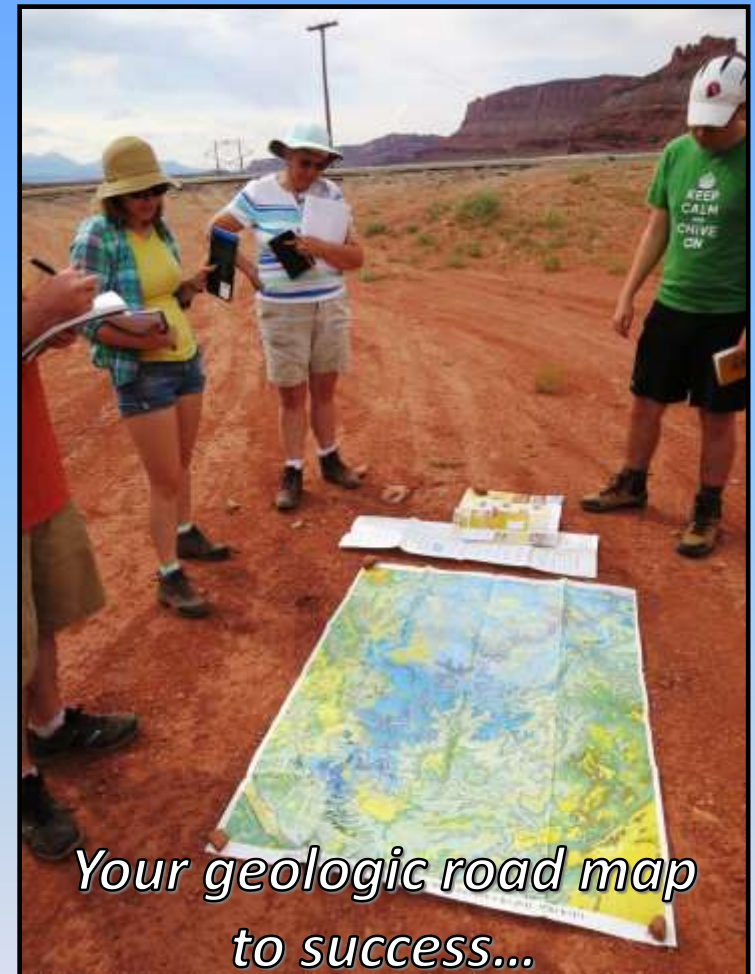
Vincent

- PG in PA, NY, TN, KY, DE
- Environmental Due Diligence, Site Assessment & Remediation
- Brownfield Redevelopment
 - Bethlehem Steel, Lehigh Valley
- Environmental Management
 - Human Health & Environment
- Decommissioning/Destruction Management
- Hazardous Material Surveys
- Market Sectors – Federal, Water, Mining, Transportation, Oil & Gas and Aviation



Today's Outline

- About PCPG
- Career & Employment Opportunities
- Job Outlook & Salaries
- How to Earn the PG/GIT License
- Job Hunting Tips



Pennsylvania Council of Professional Geologists

- PCPG is a non-profit corporation founded in 1989 by geologists seeking licensure in the Commonwealth of Pennsylvania.
- **Our Vision:** The premier organization for the advancement of the ethical and professional practice of geology and the allied sciences.
- **Our Mission:** To advance the practice of geology and allied science and the success of our members through **Advocacy, Education, and Networking.**



PCPG's Many Benefits and Opportunities

- Networking with Professionals
- College Outreach Presentations - Career Outlook, Interviewing
- Career Pathfinder Spreadsheet
- Student Poster Competition / Cash Awards
- Exam Prep for PG License / Continuing Education
- State and national news relevant to earth science professionals.

PENNSYLVANIA COUNCIL OF PROFESSIONAL GEOLOGISTS

Colleges & Students

If you would like to get involved in mentoring young geoscientists, please contact our Membership Services Chair.

Student Resource: Career Pathfinder

Updated May 12, 2020: PCPG developed a spreadsheet for college students who are unsure which college courses are most applicable to various industries or career paths. The Pathfinder spreadsheet is a suggested guide for helpful

Geology Students,
Below is a suggested guide to help with a potential career path. An XX indicates course material within that specific geology class. An X indicates course material that is not a mandatory list of various industries/career paths and are not a mandatory list of some information for a specific geologic discipline may be gained by someone designing a landfill, building or road would not generate specific conditions. Please use this chart as a general guide only. **GEOLOGIST-IN-TRAINING CERTIFICATION IN PENNSYLVANIA.** Please see the website for licensure requirements at: <https://www.dos.pa.gov>

	Oil & Gas	Coal Mining	Alt. Energy	Steel & Large Commodities / Utilities	Environment (within Energy & Industrial Industries)
Basic Geology Class	XX	XX	XX	X	
Economic Geology			X		XX
Energy Resource Reserve Estimation	XX	X	X	X	X
Engineering Geology		XX	X		XX
Environmental Field Geology	X		X		
Gas Chromatography	XX	X	X		
Geochemistry			X		
Geologic Hazards		X	XX		
Geomorphology	XX		X		
Geophysics & Imagery		XX	XX	X	
Geotechnical			XX		
Hydrogeology	X	X	XX		
Mineralogy	X				
Paleontology					

http://www.pcpog.org/Student_Page

Geology Students Happiest

- A 2015 UK National Survey polled 220,000 students*
- 95% of geology majors said they were satisfied with their major
- Geoscience ranked top 20%, #28 by the Most Valuable College Majors**

Forbes / Science

DEC 18, 2015 @ 05:43 PM 170,360 VIEWS

Geology Students Are The Happiest On College Campus Study Finds



South Park's resident geologist Randy Marsh (Credit: southpark.cc.com)

Geology students are the happiest with their degrees according to the National Student Survey, which polls university students across UK colleges and universities for satisfaction in their school and their major. An impressive 95% of

1. Allows you to pursue your curiosity.
2. Field Trips!
3. Geology can take you around the world
4. Solve Problems
5. Variety of different career paths
6. Cutting edge technology
7. Employment growth
8. Job opportunities right out of college with a BS and MS
9. Laid back field and small community of colleagues
10. Geology lets you study ROCKS!!!



*<http://www.forbes.com/sites/trevornace/2015/12/18/geology-students-happiest-college-campus-study/>

**<https://www.bankrate.com/career/most-valuable-college-majors/>



Career and Employment Opportunities

- Environmental Science/Protect Human Health
- Energy Resources
- Mineral Resources
- Engineering Geology and Natural Hazards
- Research
- Education



Environmental Science/Human Health

Geologists make use of their special knowledge for the benefit of others. No profession affects the public more than geology. "Civilization exists by geological consent, subject to change without notice," William Durant



- Investigate environmental contamination, protect human and ecological health, remediate contaminants, assess water resources
- Jobs across the US, major metropolitan areas, cities, suburbs, towns, rural, and remote areas



Industry / Consulting

- Brownfield's / PA Act 2
- UST / AST Investigation and Remediation
- Landfill Design and Investigation
- Environmental Permitting
- Steel & Large Commodities
- Utilities (PPL, PECO)



Government Agencies

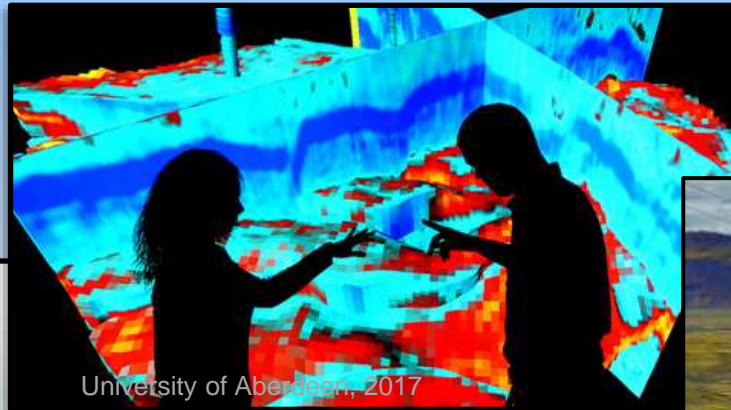
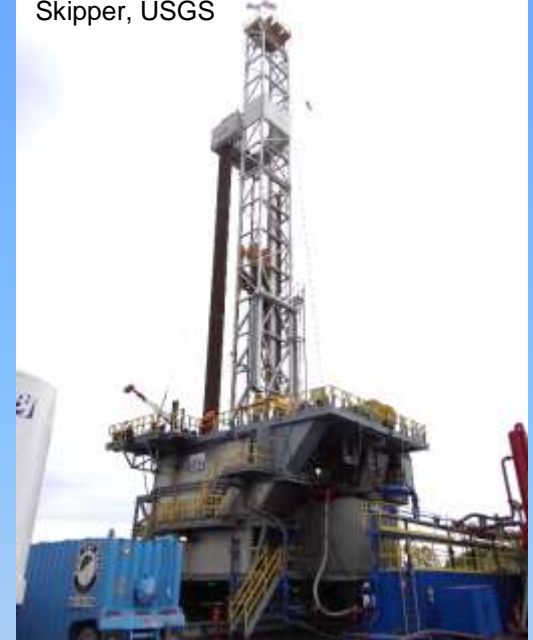
- US Geologic Survey
- US Environmental Protection Agency
- PA Department of Environmental Protection
- Department of Conservation and Natural Resources
- PA Geological Services
- Susquehanna River Basin Commission
- County Agencies
- Etc.



Energy Resources

- Study the subsurface and explore for oil, natural gas, coal, uranium, & geothermal
- Responsibly extract resources
- Many jobs in Gulf Coast states, Colorado, Dakotas, & overseas – Australia, middle east
- Jobs in PA, OH, & WV with Marcellus and Utica Shale Gas

Marcellus Shale Drill Rig, SW PA, Ken Skipper, USGS



University of Aberdeen, 2017



Arlt, 2016

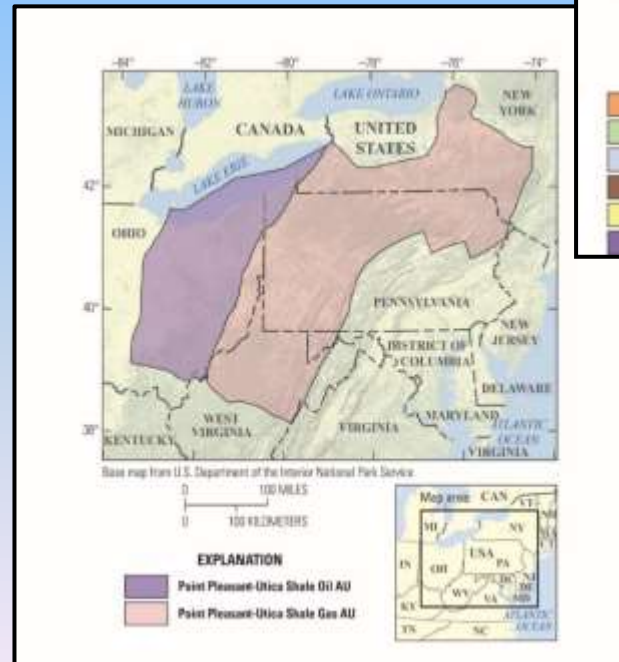
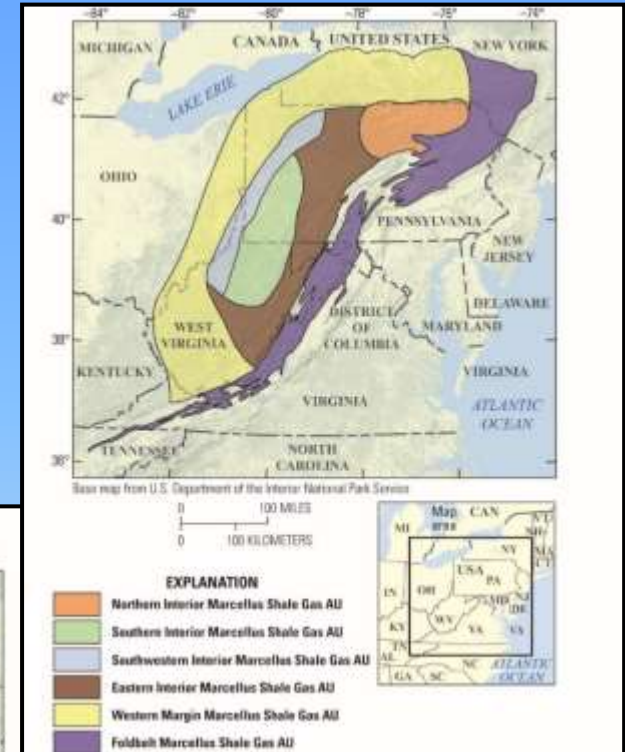


<https://www.power-technology.com/Geothermal-Plant>



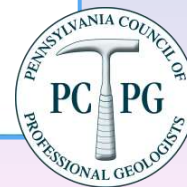
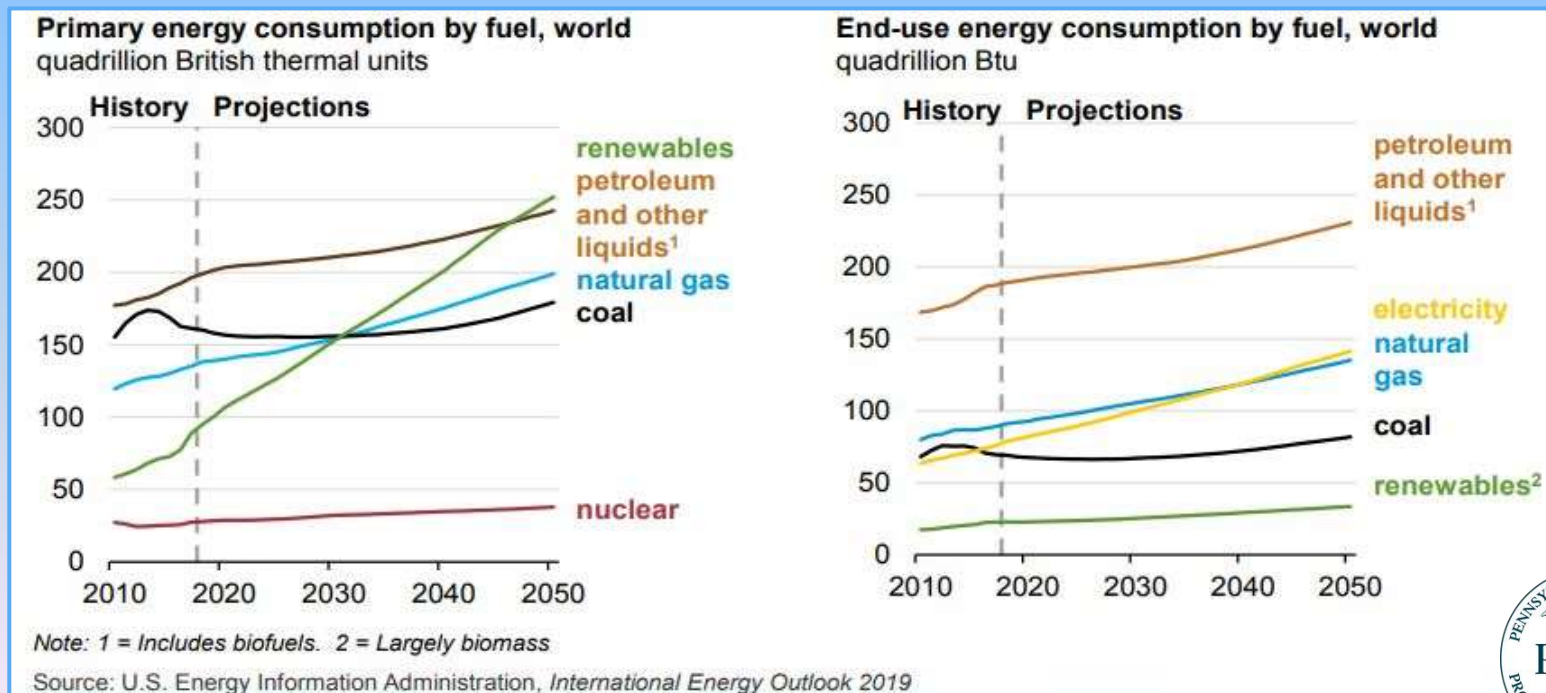
Marcellus/Utica Shale – Game Changer for PA/World

- The US is the World's #1 Natural Gas Producer
- PA #2 produces 20% of total US Natural Gas Production
Ohio #5 produces 7.7%
- 18+ Billion cu. Ft/day
- October 2019 USGS assessments
 - 214 trillion cubic feet of undiscovered natural gas
 - 1.5 billion barrels of natural gas liquids(NGL) in Marcellus
 - 1.8 billion barrels of oil and 985 million barrels of NGLs Point Pleasant-Utica Shale
- NGLs are liquid hydrocarbons like propane, butane and/or ethane.
- NGL's provide feedstock in petrochemical plants to make chemicals, plastics, and synthetic rubber along with fuels for heating, cooking, and drying.



International Energy Outlook

- World Energy Consumption expected growth 30%+ by 2050
 - Renewables displace petroleum as the most used energy source
 - Electricity use grows faster than any other end-use fuel.
 - Electricity generation est. ~35% gas & ~35% renewable by 2050
- (End-Use consumption excludes fuels for electric power generation.)
- Fossil Fuels continue as end-use fuels used in the industrial, transportation and building sectors.



Mineral Resources

- Explore for mineral resources. Find aggregate, ore bodies, and direct mining operations.
- Identify and develop water resources
- Jobs available world-wide and in our backyard



Extraction Industries

- **Coal Mining & Quarries**

- Steel
- Cement



- **Alternative Energy**

- **Solar Photovoltaics***

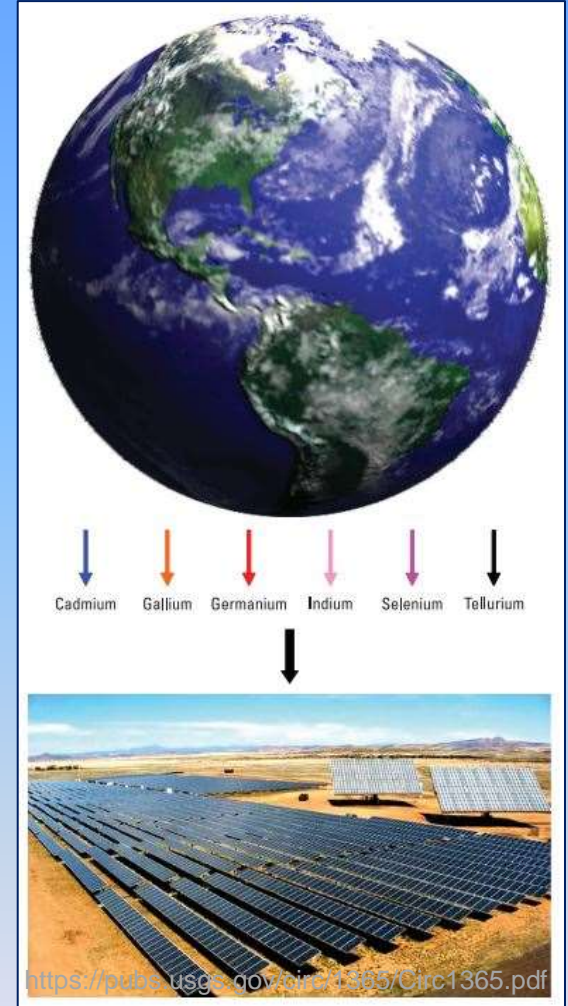
- Aluminum, cadmium, copper, gallium, indium, iron/steel, lead, nickel, silica, silver, selenium, tellurium, tin, zinc

- **Lithium Battery storage***

- Aluminum, cobalt, iron, lead, lithium, manganese, nickel

- **Wind Turbines****

- Bauxite(Aluminum)
- Coal, Iron Ore & molybdenum(steel)
- Cobalt and rare earth elements(magnets)
- Copper(wiring)
- Limestone, gypsum, silica sand, aggregate(concrete)
- zinc



*<http://www.levinources.com/assets/pages/Green-Economy-Series-Solar-Photovoltaic-and-Energy-Storage-in-the-Electric-Grid.pdf>

**https://mineralseducationcoalition.org/wp-content/uploads/mec_fact_sheet_wind_turbines_0.pdf



Engineering Geology and Natural Hazards

- Investigate the physical properties of the Earth for our Nation's infrastructure and help mitigate natural disasters



Industry / Consultants / Public Safety

- Flooding
- Water Treatment
- Water Supply Management
- Solid Waste
- Landslides and Karst
- Road & Building Construction
- Earthquakes



International Options



- **Energy**

- Petroleum – Saudi Arabia, Canada, Venezuela, Iran, Iraq, Kuwait, Russia, Libya, Nigeria, China
- Natural Gas – Russia, Qatar, Iran, Canada, China, Norway, Netherlands, Algeria

- **Extraction**

- Mining - Australia, Peru, Chile, South Africa, Mexico, Russia, China, Germany have a large mining industry
- Coal, gold, uranium, bauxite, copper, lead, silver, zinc, diamonds, chrome, manganese, platinum, vermiculite, rare Earth elements

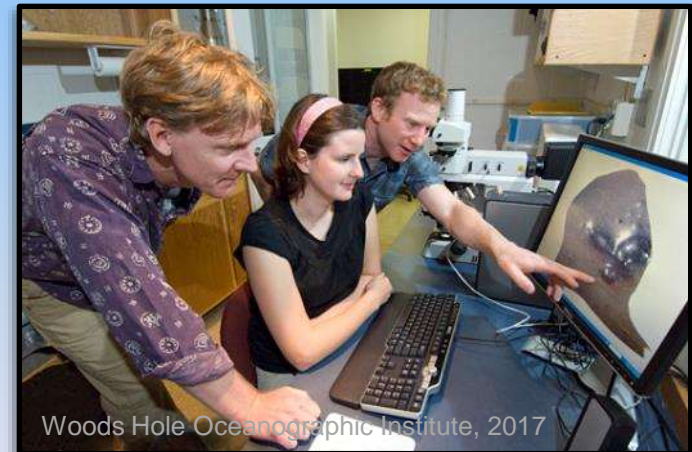
- **Environmental /Engineering**

- Geology, geophysics, geotechnical, hydrogeology, water resources, engineering, research science
- Developing countries, Asia, India, Saudi Arabia



Research

- Pure and applied research to study all aspects of the earth, including laboratory, field, numerical, and theoretical fields.
- Developing new methods to support future generations.
- Research geoscientists work as college professors, government employees, and commercial research and development teams.



Education

- Teaching earth science and related fields in the early, middle, and secondary grades
- College professor
- Educate the next generation
- Job security and competitive salary

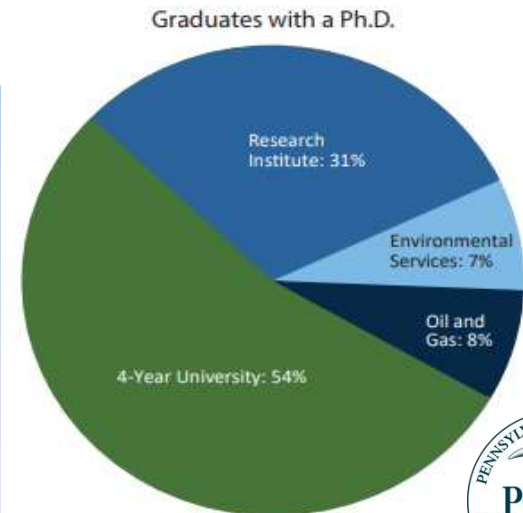
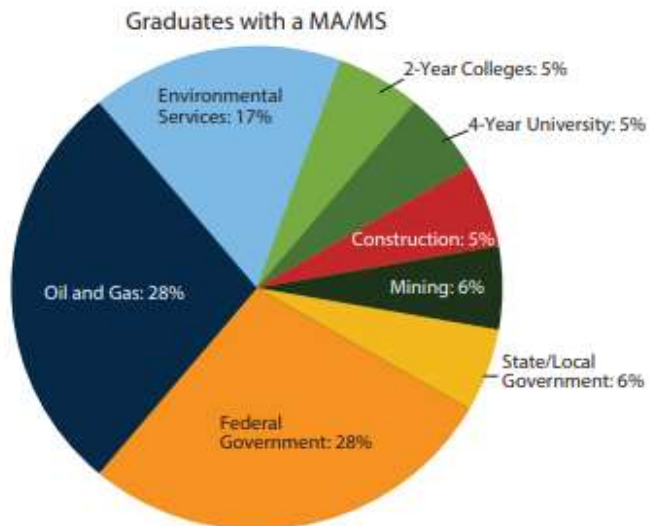
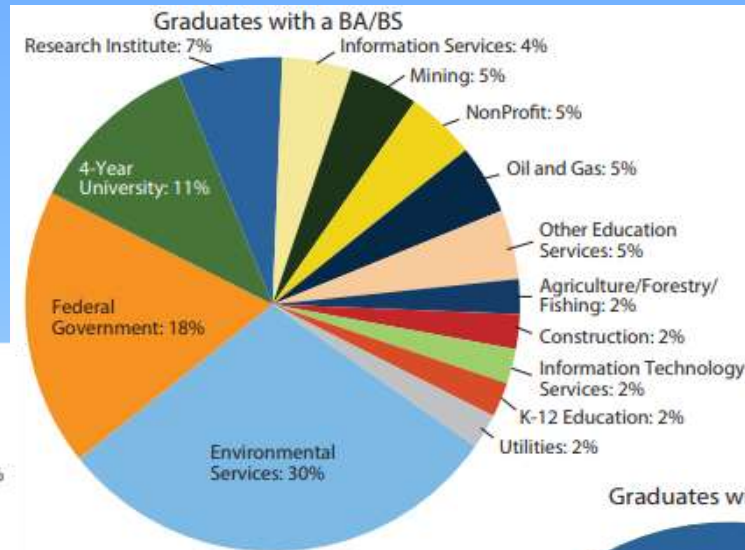


Job Outlook and Salary



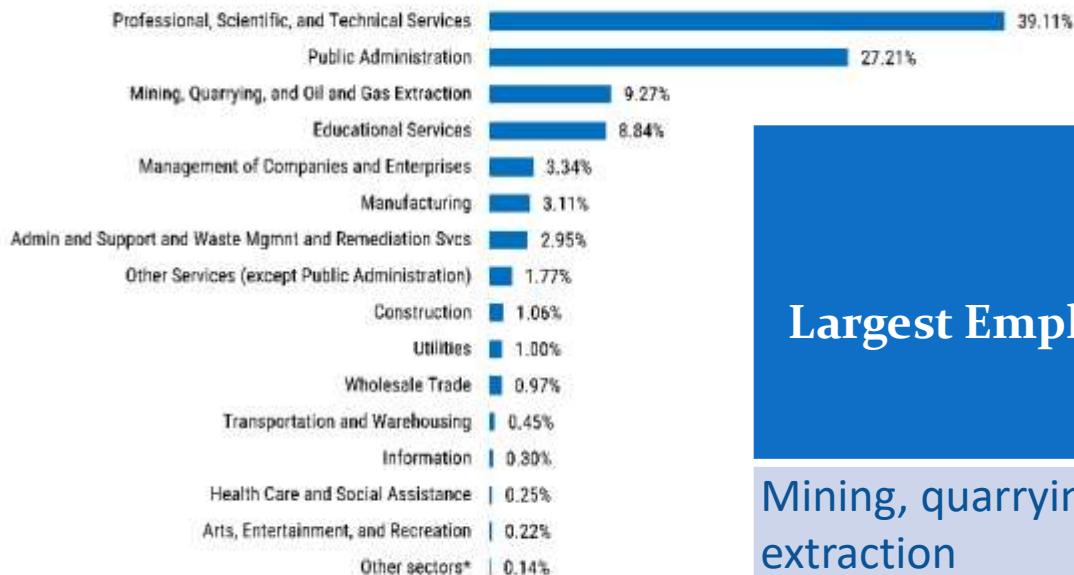
Industries Employing 2017 Graduates by Degree

- Nationwide AGI student survey across all geologic disciplines



Top Industry Sector Employing Geologists

Percentage of employed geoscientists by industry sector, May 2019

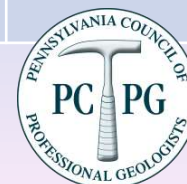


Credit: AGI; data derived from the U.S. Bureau of Labor Statistics, Occupational Employment Statistics, May 2019

Largest Employers of Geoscientists

2019 Median Annual Wage

Mining, quarrying, and oil and gas extraction	\$126,750
Federal government	100,590
Architectural, engineering, and related services	82,190
State government	76,580
Colleges, universities, and professional schools; state, local, and private	74,010



https://www.americangeosciences.org/sites/default/files/DB_2020-019_chart03-RecentGradEmploymentBySector.jpg

<https://www.bls.gov/ooh/life-physical-and-social-science/geoscientists.htm#tab-5>

5%-8% Job Growth Expected Through 2029

Environmental Scientists and Specialists

Percent change in employment, projected 2019-29

Environmental scientists and specialists 8%

Hydrologists

Percent change in employment, projected 2019-29

Hydrologists 5%

Geoscientists

Percent change in employment, projected 2019-29

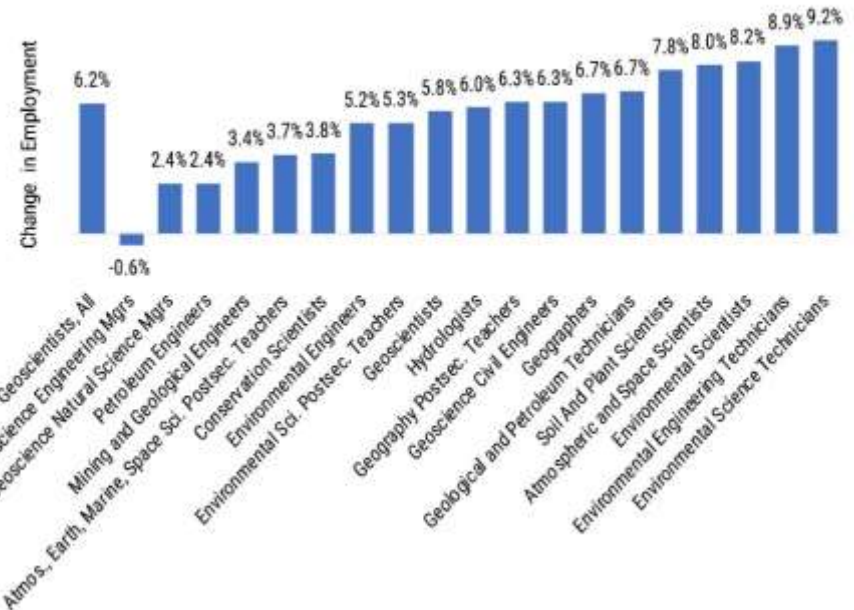
Physical scientists 5%

Geoscientists, except hydrologists and geographers 5%

Total, all occupations 4%

Note: All Occupations includes all occupations in the U.S. Economy.
Source: U.S. Bureau of Labor Statistics, Employment Projections program

Projected Geoscience Workforce Changes by Occupation 2018-2028

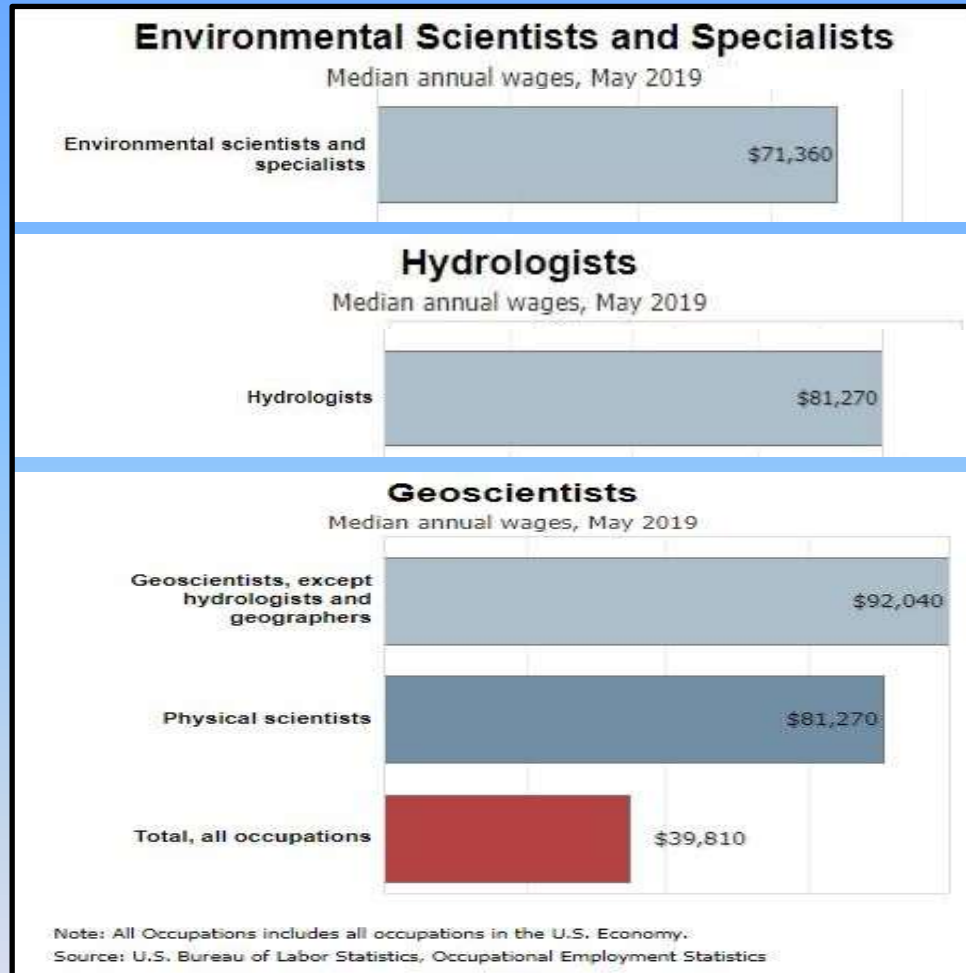


Source: AGI Geoscience Workforce Program; Data derived from the U.S. BLS Employment Projections

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Environmental Scientists and Specialists, on the Internet at
<https://www.bls.gov/ooh/life-physical-and-social-science/environmental-scientists-and-specialists.htm> (visited September 01, 2020).
<https://www.bls.gov/ooh/life-physical-and-social-science/hydrologists.htm> (visited September 01, 2020).
<https://www.bls.gov/ooh/life-physical-and-social-science/geoscientists.htm> (visited September 01, 2020).



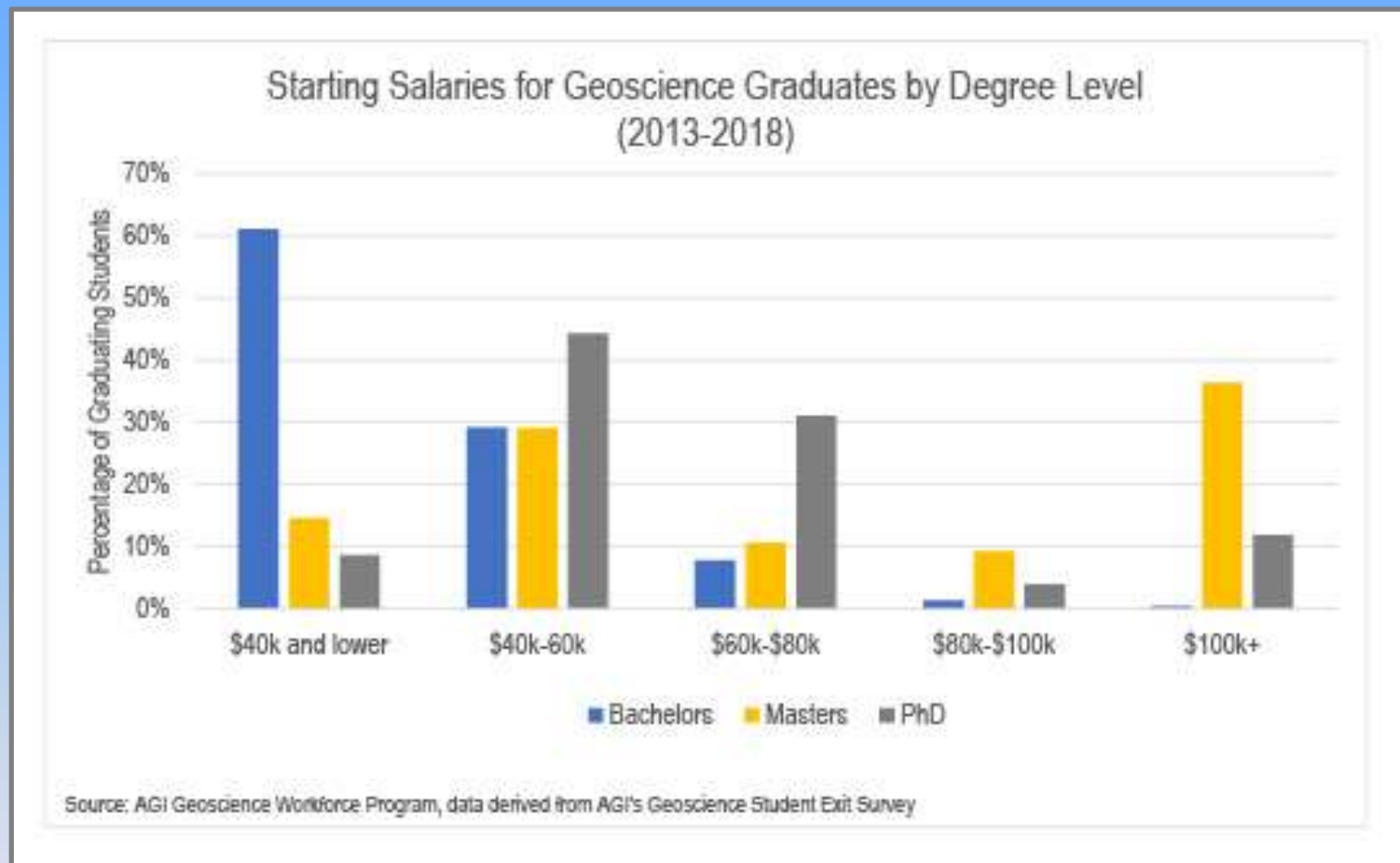
Median Annual Salary



Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*:
Geoscientists, on the Internet at <https://www.bls.gov/ooh/life-physical-and-social-science/geoscientists.htm> (visited September 01, 2020).
Hydrologists, on the Internet at <https://www.bls.gov/ooh/life-physical-and-social-science/hydrologists.htm> (visited September 02, 2020).
Environmental Scientists and Specialists, on the Internet at <https://www.bls.gov/ooh/life-physical-and-social-science/environmental-scientists-and-specialists.htm> (visited September 01, 2020).



Starting Salaries



The PG License and GIT Certificate



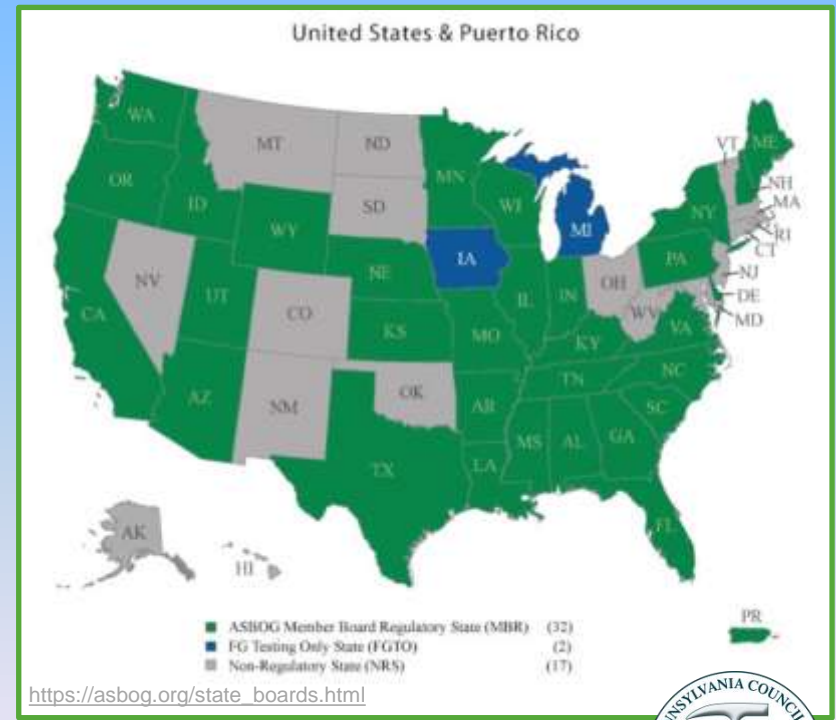
Why Do Geologists Need a Professional License?

- **Why register?**

- Illegal to practice without a license in PA and 31 other states (oil & gas geologists generally exempt)
- Geologic data often involves public health, safety, and welfare
- PG's use sound geologic principals to avoid endangering the public or the environment.

- **License Benefits**

- High professional & ethical standards
- Protects jobs of well-qualified geologists
- Most geologic reports submitted to regulatory agencies require a PG seal.



Geologist-in-Training (GIT)

- The First Step to a PG is a GIT
- Requirements are the same as a PG EXCEPT for Experience
 - Good Moral Character
 - College Degree in Geology, Geochemistry, Geophysics or Engineering Geology
 - Five years of geological work
 - Two examinations to demonstrate minimum competence
 - Fundamentals of geologic knowledge (FG)
 - Practice of geology (PG)
- GIT requires passing the FG
- Applicants responsible to submit documentation substantiating coursework
- After 5 years of appropriate & progressive work experience can qualify to sit for PG exam



<http://blogs.discovermagazine.com/rockypolice/files/2019/08/multimediaFile-2272.jpg>

Get a Geologist in Training Certificate (GIT)

- A Geologist In Training Certificate (GIT), issued by the Commonwealth of Pennsylvania State Registration Board of Professional Engineers, Land Surveyors and Geologists, requires the same education and standards as a Licensed PG.
- Provide three references from Licensed Professional Geologists.
- The FG exam is based on a diverse knowledge of geologic terms and concepts learned during undergraduate education so it's beneficial to take the FG while still in school or soon after graduation.
- Take the FG exam if you have completed at least two or more years of an appropriate geology program if approved by the board but the GIT certificate won't be issued until you submit proof of graduation.
- A GIT only has to demonstrate five years of appropriate and progressive work experience plus the required professional references to qualify to sit for the PG exam.



PG/GIT Educational Requirements

- 4-year geology, geophysics, geochemistry, or engineering geology degree
OR
- A degree and 30 sem. credits of geology, 24 must be 300-level or above
- Must have **Structural Geology** and **Field Geology** on transcript
- GIT Only: Board may approve sitting for the FG exam for a Junior or Senior who already has Structural Geology and Field Geology on their transcript
- Transcripts are reviewed by the Licensing Board
- **Common Geology Courses**

Field Geology

Physical Geology

Mineralogy

Geophysics

Sedimentology

Soil/Rock Mechanics

Structural Geology

Historical Geology

Geochemistry

Stratigraphy

Hydrogeology

Environmental

Tectonics

Petrology

Engineering Geology

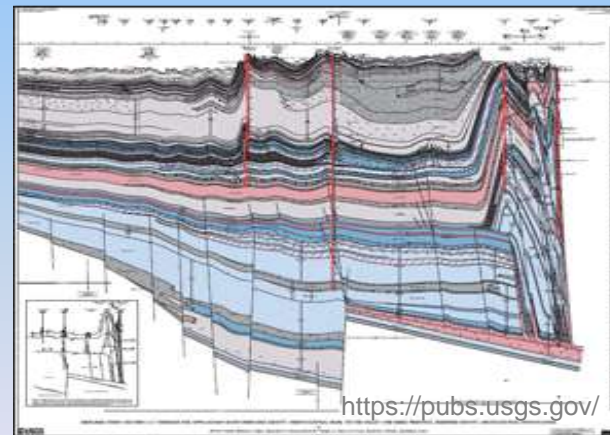
Paleontology

Geologic Hazards



From the Law...

- (2) The formal education required under this subsection must include **field geology and structural coursework** that is sufficient to **demonstrate** that the candidate has **educational experience in tectonics and fractured bedrock geology** and the **field methods** needed to **measure, map and evaluate geologic data***



*http://www.irrc.state.pa.us/regulation_details.aspx



GIT Certification & PG License Application Workflow

1

**Apply for
License/Certification with
PA Dept. of State thru
PA License System (PALS)**

<https://www.pals.pa.gov/#/page/default>



The Board reviews your
application
\$50

2

**Apply for Exam
Pearson VUE**

<https://home.pearsonvue.com>



Create online
account and register
for exam(s)
\$175 each

3

**Take Exam
Association of State
Boards of Geology**

<http://www.asbog.org/>



ASBOG writes and grades
the FG and PG Exams

Please check the Pearson Vue Website for all COVID restrictions for testing centers



Licensure is Managed Through the PA Dept. of State

Pennsylvania Council of Professional Geologists



- Professional Organization
- Represents Working Geologists
- Professional Advocacy, Education, Networking



Pennsylvania Department of State, Bureau of Licensing and Professional Affairs

State Registration Board of Engineers, Surveyors, and Geologists



- Manages Licenses
- Reviews License Applications
- Hears Disciplinary Actions/Appeals



For Information Start with Pearson Vue Website

<https://home.pearsonvue.com>

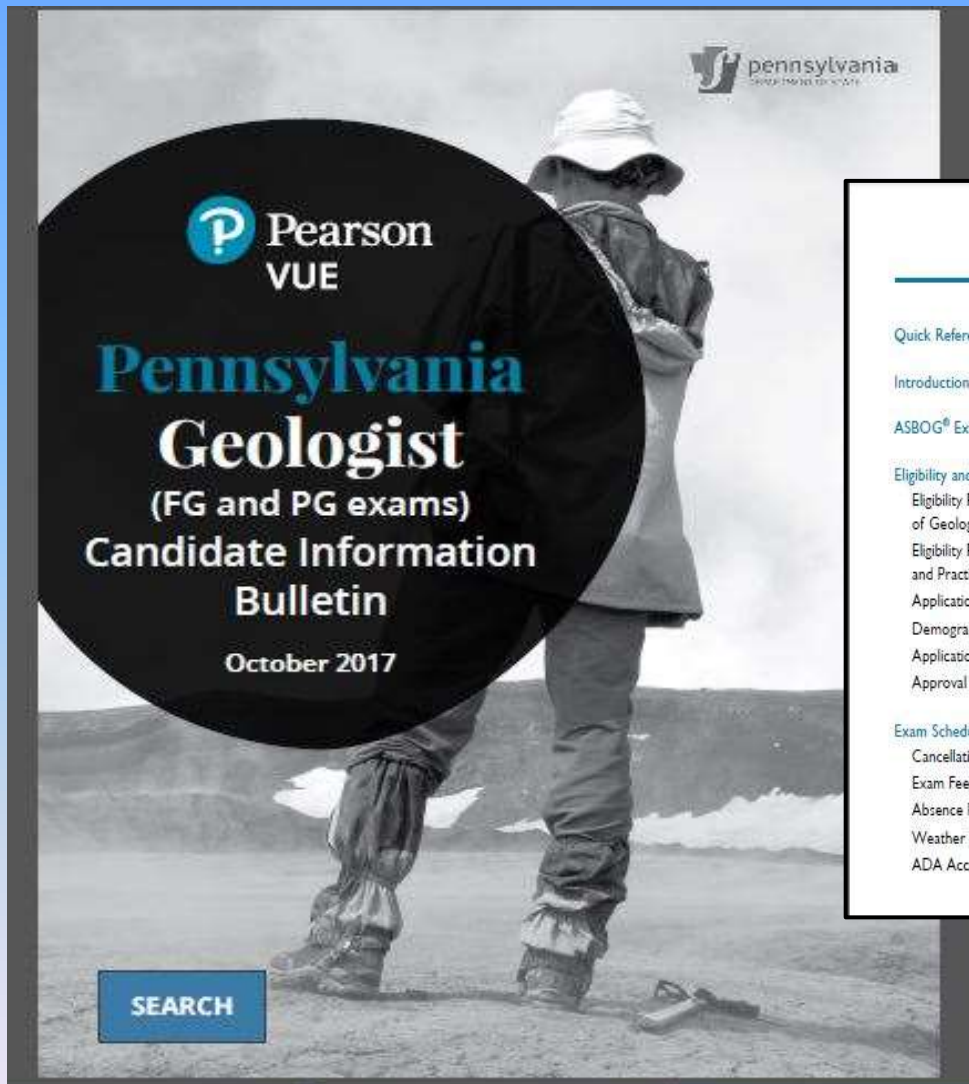


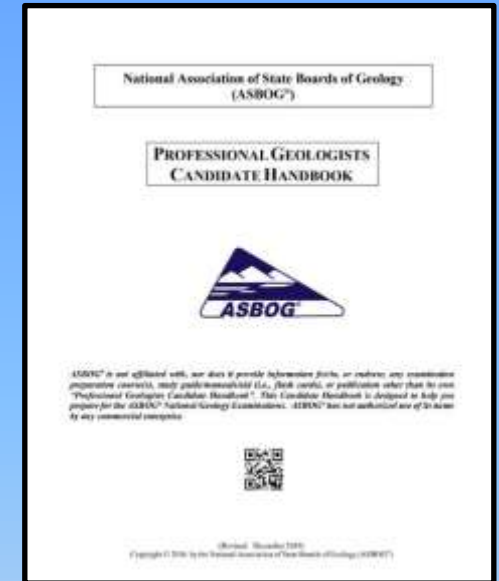
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About the ASBOG Exam(s)

- Fundamentals of Geology: 140 Questions
- Practice of Geology: 110 Questions
- Must receive a score of 70 percent to pass
- Study for at least 12 months, consider taking review course
- Best to take the FG while the info is fresh from school
- Includes sample questions and answer key in all disciplines



FG and PG Test Blueprints

Content Domains	FG %	PG %
A. General and Field Geology	21	20
B. Mineralogy, Petrology, and Geochemistry	11	5
C. Sedimentology, Stratigraphy, and Paleontology	12	6
D. Geomorphology, Surficial Processes, and Quaternary Geology	13	8
E. Structure, Tectonics, and Seismology	11	8
F. Hydrogeology	12	19
G. Engineering Geology	11	19
H. Economic Geology and Energy Resources	9	15
TOTALS	100	100

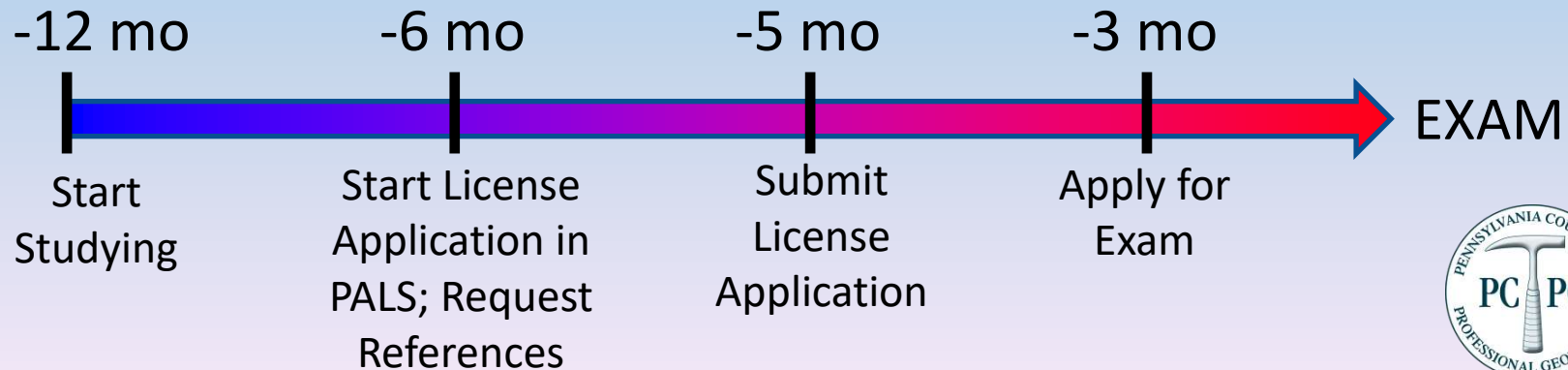
<https://asbog.org/index.html>



Deadlines and Recommended Timeline

ASBOG Exam Date	Last Day to Schedule thru Pearson VUE	PG License Application** Submitted to PA DOS
October 1, 2021	September 1, 2021	June 15, 2021
March 18, 2022	February 18, 2022	November 15, 2021
October 7, 2022	September 7, 2022	June 15, 2022
March 17, 2023	February 17, 2023*	November 15, 2022
October 6, 2023	September 6, 2023*	June 15, 2023
March 15, 2024	February 15, 2024*	November 15, 2024
October 4, 2024	September 4, 2024*	June 15, 2024

- Deadlines are firm dates (*approx. date as current Pearson VUE info only listed through 2022)
- **All supporting documentation and forms must be received by date
- Application must be approved prior to scheduling exam with Pearson Vue
- Suggested timeline:



Continuing Education- Act 25, 2010

- 24 hours every 2 years
- Maintain, improve or expand skills and knowledge obtained prior to initial licensure, includes law and ethics or develop new and relevant skills and knowledge.
- Continuing education courses, professional society talks, conferences, college courses, publications, patents
- Must maintain Activity Log



PENNSYLVANIA STATE REGISTRATION BOARD FOR PROFESSIONAL ENGINEERS, LAND SURVEYORS AND GEOLOGISTS

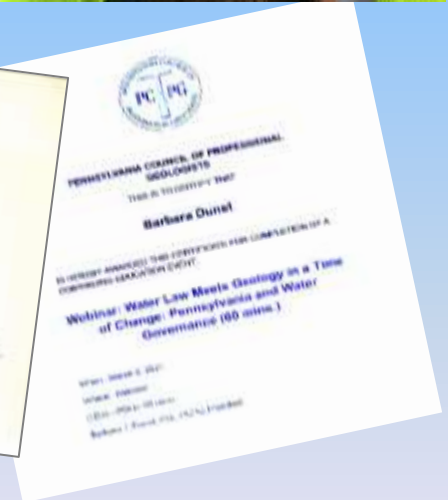
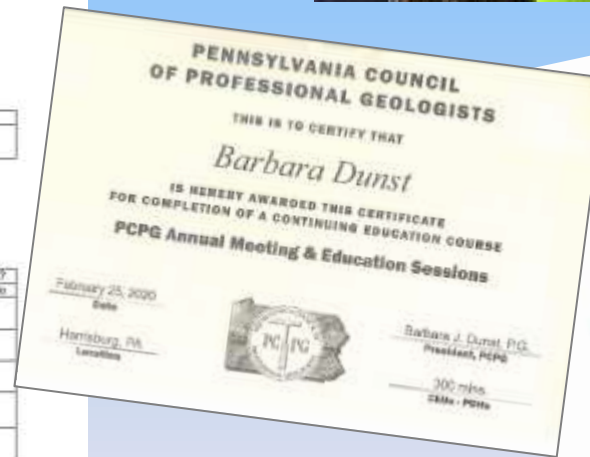
Continuing Professional Competency Activity Log

Your Full Name		Complete License Number (allies and all numbers including zero)					

All activities must be relevant to professional practice 1 PDH = 50 minutes of instruction or presentation

Continuing Professional Competency Activities CE courses, correspondence, televised, videotaped, short courses, tutorials, seminars, employer-sponsored courses, workshops or conferences relevant to professional practice

Date(s) of Course	Title of Course	Sponsor/Provider Name	Location	Instructor	Duration	PDH	Taught?	
							Yes	No



PCPG is a Great Source for Continuing Ed Credits!

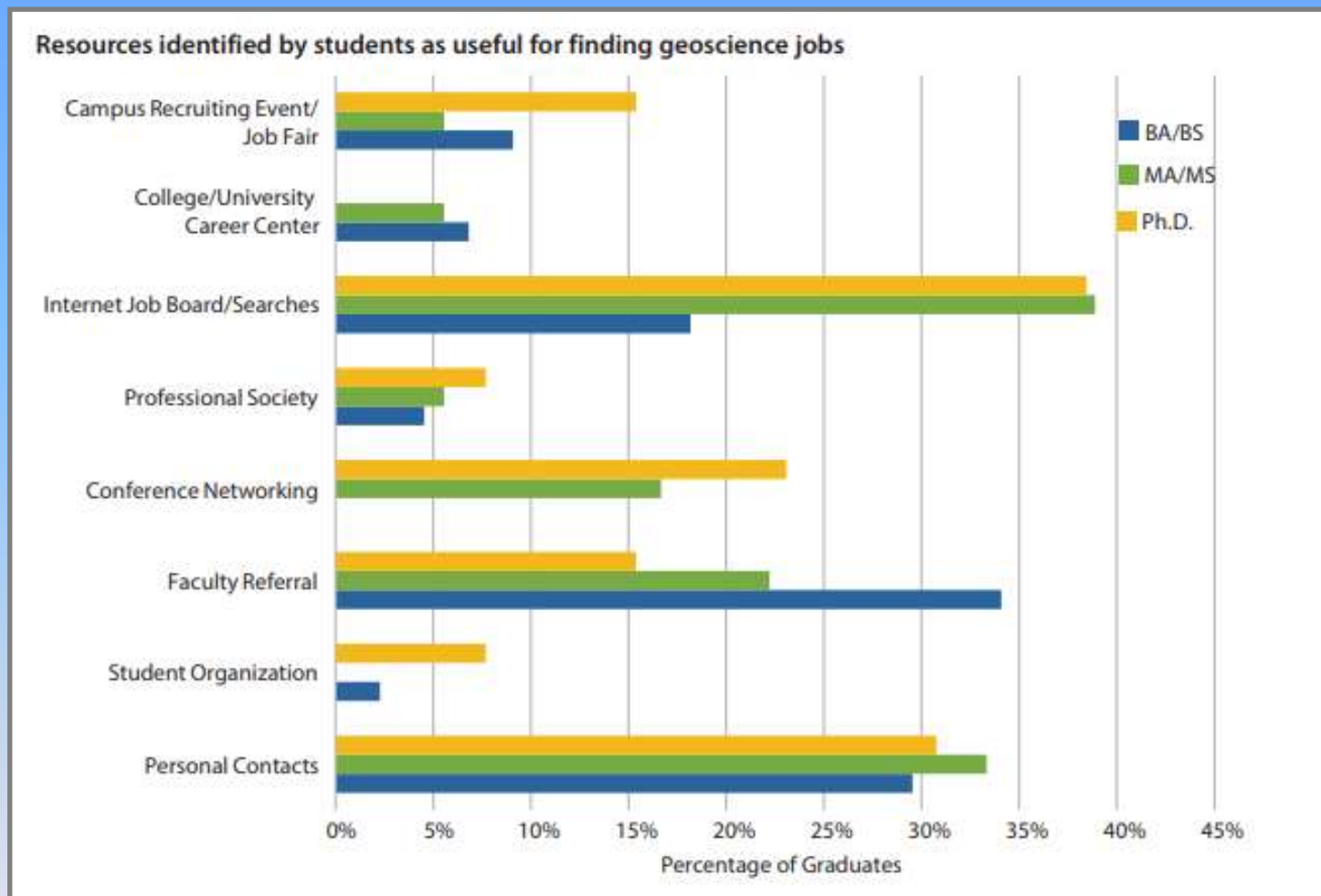




<https://blog.4tests.com/wp-content/uploads/2016/03/Screen-Shot-2016-03-31-at-2.11.26-PM.png>



What's Useful for Finding a Job?



Job Hunting Tips

- **Network**

- It's all about "who you know".
- Attend local professional conferences
- (PCPG, AEG, PGS, SWEP, etc.)
- **TALK** to professionals – put your phone down!
- Faculty referrals
- Connect with alumni



- **Resume**

- Include pertinent information up front.
- Education, certifications, pertinent coursework
- Papers, presentations, research, and awards
- Internships
- Proofread! Spellcheck! Proofread!
- Proofread Again!!!!



Job Hunting Tips

- **Create a professional LinkedIn media account**
 - Make sure all social media posts/pictures are appropriate
- **Earn Certifications**
 - Geologist In Training GIT
 - OSHA 40-hr HAZWOPER Certification
 - Consider specialty skills such as GIS.
- **Sell yourself**
 - Celebrate your unique gifts and experience!
 - Eyes Level with Screen, check your background, speak clearly
 - Practice with someone – phone and video



Remember to NETWORK

Thank you for your time!

Good Luck with Career Choice & your Job Search

Reach out and let us know how we can help

www.PCPG.org “Linked In”

