A Career as a Professional Geologist

Presented by

Barb Dunst, PG, CPG
PCPG President

Youngstown State University
February 24, 2021
A little bit about Barb...

- BS in Geology from IUP
- PG in Pennsylvania and CPG (national)
- Worked for Consultants, Industry and PA DEP
- Primarily in Energy – Coal & Natural Gas
- Coal Exploration, Permitting, and Investigations
  - Underground, surface mining, refuse piles & preparation plants
  - Pre-mine, active and abandoned mining
- Natural Gas Negotiations, Contracts, & Coordination
- Environmental
  - Contaminant plume migration
  - Landfill leachate investigations
  - Private water supplies
  - Stray gas and water loss
- Engineering Geology
  - Windfarm soil stability
  - Landslides
  - Soil borrow areas
Today’s Outline

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

http://www.pcpg.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**

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!!!

**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)


http://www.ac-environmental.co.uk/
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

[Images of Marcellus Shale Drill Rig, SW PA, Ken Skipper, USGS]

[Images of University of Aberdeen, 2017]

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.

[Graphs showing energy consumption trends by fuel type, including historical data and projections to 2050]

Note: 1 = Includes biofuels. 2 = Largely biomass
https://www.eia.gov/pressroom/presentations/capuano_09242019.pdf
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

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

PROJECTIONS

- Labor Force
- Macroeconomic
- Industry
- Occupational
Industries Employing 2017 Graduates by Degree

- Nationwide AGI student survey across all geologic disciplines

Top Industry Sector Employing Geologists

Largest Employers of Geoscientists

<table>
<thead>
<tr>
<th>Industry Sector</th>
<th>2019 Median Annual Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining, quarrying, and oil and gas extraction</td>
<td>$126,750</td>
</tr>
<tr>
<td>Federal government</td>
<td>100,590</td>
</tr>
<tr>
<td>Architectural, engineering, and related services</td>
<td>82,190</td>
</tr>
<tr>
<td>State government</td>
<td>76,580</td>
</tr>
<tr>
<td>Colleges, universities, and professional schools; state, local, and private</td>
<td>74,010</td>
</tr>
</tbody>
</table>


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

Projected Geoscience Workforce Changes by Occupation 2018-2028

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

Median Annual Salary

Environmental Scientists and Specialists
Median annual wages, May 2019

Hydrologists
Median annual wages, May 2019

Geoscientists
Median annual wages, May 2019

Note: All Occupations includes all occupations in the U.S. Economy.

Starting Salaries

Starting Salaries for Geoscience Graduates by Degree Level (2013-2018)

Source: AGI Geoscience Workforce Program, data derived from AGI’s Geoscience Student Exit Survey

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.

https://asbog.org/state_boards.html

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
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**

<table>
<thead>
<tr>
<th>Field Geology</th>
<th>Structural Geology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Geology</td>
<td>Historical Geology</td>
</tr>
<tr>
<td>Mineralogy</td>
<td>Geochemistry</td>
</tr>
<tr>
<td>Geophysics</td>
<td>Stratigraphy</td>
</tr>
<tr>
<td>Sedimentology</td>
<td>Hydrogeology</td>
</tr>
<tr>
<td>Soil/Rock Mechanics</td>
<td>Environmental</td>
</tr>
<tr>
<td></td>
<td>Tectonics</td>
</tr>
<tr>
<td></td>
<td>Petrology</td>
</tr>
<tr>
<td></td>
<td>Engineering Geology</td>
</tr>
<tr>
<td></td>
<td>Paleontology</td>
</tr>
<tr>
<td></td>
<td>Geologic Hazards</td>
</tr>
</tbody>
</table>

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
Licensure is Managed Though 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

TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick Reference</td>
</tr>
<tr>
<td>Introduction</td>
</tr>
<tr>
<td>ASBOG® Examination Information</td>
</tr>
<tr>
<td>Eligibility and Application Process</td>
</tr>
<tr>
<td>Eligibility Requirements for the ASBOG® Fundamentals of Geology Examination</td>
</tr>
<tr>
<td>Eligibility Requirements for the ASBOG® Principles and Practices of Geology Examination</td>
</tr>
<tr>
<td>Application Deadlines</td>
</tr>
<tr>
<td>Demographic Changes</td>
</tr>
<tr>
<td>Application Fee</td>
</tr>
<tr>
<td>Approval to Test Notice</td>
</tr>
<tr>
<td>Exam Scheduling, Cancellation, and Rescheduling</td>
</tr>
<tr>
<td>Cancellation and Rescheduling Policy</td>
</tr>
<tr>
<td>Exam Fee</td>
</tr>
<tr>
<td>Absence Policy</td>
</tr>
<tr>
<td>Weather Emergencies</td>
</tr>
<tr>
<td>ADA Accommodations</td>
</tr>
<tr>
<td>Exam Day</td>
</tr>
<tr>
<td>What to Bring</td>
</tr>
<tr>
<td>Required Items</td>
</tr>
<tr>
<td>Acceptable Items in the Testing Room</td>
</tr>
<tr>
<td>Prohibited Items</td>
</tr>
<tr>
<td>Acceptable Forms of Candidate Identification</td>
</tr>
<tr>
<td>Name Matching Guidelines</td>
</tr>
<tr>
<td>Testing Policies</td>
</tr>
<tr>
<td>Listeners</td>
</tr>
<tr>
<td>Electronic Devices</td>
</tr>
<tr>
<td>Personal Belongings/Study Aids</td>
</tr>
<tr>
<td>Eating/Drinking/Smoking</td>
</tr>
<tr>
<td>Misconduits</td>
</tr>
<tr>
<td>Guests/Visitors</td>
</tr>
</tbody>
</table>
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**

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

https://asbog.org/index.html
# Deadlines and Recommended Timeline

<table>
<thead>
<tr>
<th>ASBOG Exam Date</th>
<th>Last Day to Schedule thru Pearson VUE</th>
<th>PG License Application** Submitted to PA DOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 19, 2021</td>
<td>February 12, 2021</td>
<td>November 15, 2020</td>
</tr>
<tr>
<td>October 1, 2021</td>
<td>September 1, 2021</td>
<td>June 15, 2021</td>
</tr>
<tr>
<td>March 18, 2022</td>
<td>February 18, 2022</td>
<td>November 15, 2021</td>
</tr>
<tr>
<td>October 7, 2022</td>
<td>September 7, 2022</td>
<td>June 15, 2022</td>
</tr>
<tr>
<td>March 17, 2023</td>
<td>February 17, 2023*</td>
<td>November 15, 2022</td>
</tr>
<tr>
<td>October 6, 2023</td>
<td>September 6, 2023*</td>
<td>June 15, 2023</td>
</tr>
</tbody>
</table>

- 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:

-12 mo  
Start Studying

-6 mo  
Start License Application in PALS; Request References

-5 mo  
Submit License Application

-3 mo  
Apply for Exam

EXAM
Continuing Education

• Act 25, 2010
• 24 hours every 2 years
• Continuing education courses, professional society talks, conferences
• Good way to continue networking
• College courses, publications, patents
• Must maintain Activity Log
HIRE ME!
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”

bjd641@gmail.com