# Geology 361: Review for Exam 3 (Fall 2009)

## Chapter 14: Fossil Fuels
1. Know the source of oil and gas and what is required for their formation.
2. Understand what is meant by source, reservoir and cap rocks.
3. Why are fossil fuels considered nonrenewable?
4. Explain the standard recovery of oil—what are the primary and secondary steps?
5. What methods are used to enhance oil recovery? Why is this necessary?
6. Understand the pros and cons of the 2 alternate oil resources being considered.
7. Be familiar with the 3 alternate natural gas resources discussed in class.
8. Describe the formation of coal. What is the starting material for coal? What is the difference between low and high grade coals (why is anthracite more favored?)?
9. Know the 2 limitations of coal use discussed in class.
10. What is coal gasification? Coal liquefaction? Why are these processes of interest?
11. What are the 3 environmental impacts of burning coal?
12. Know the hazards resulting from our dependency on coal and oil.

## Chapter 15: Alternative Fuels
1. What is hydropower and what are the limitations of hydropower?
2. Understand how energy is gained from tidal power, wave energy, and ocean thermal energy conversion (OTEC). Be familiar with specific limitations of each.
3. What is the major limitation of solar energy? In what 2 ways is solar power most useful? Describe passive versus active heating. In terms of electricity generation, know the limitations of photovoltaic cells.
4. Know the major limitations of wind energy.
5. What are the 2 sources of geothermal energy? Know the limitations of geothermal energy discussed in class.
6. What are the 2 geothermal alternative resources discussed in class?
7. Understand nuclear fusion versus nuclear fission, and which process is in current use. What are burner and breeder reactors? Why does the U.S. have no breeder reactors?
8. What is the most common nuclear fuel source? Why do we import it?
9. Know the 3 primary concerns with using nuclear fuel. What is meant by a core meltdown? Why is the health of miners of concern? Understand why nuclear wastes are much harder to deal with.
10. What is ‘star in a jar’ and why is it so attractive? Why don’t we rely on cold fusion?

## Chapter 16: Wastes
1. What are the 3 broad categories of waste discussed in class?
2. What are the 2 biggest generators of solid wastes? What type of waste is the most abundant waste generated per person?
3. Know the 6 ways of solid waste disposal discussed in class.
4. What is the primary benefit of incineration of wastes? What are the negative concerns with incineration? Understand what is a “waste-to-energy” plant.
5. What are the primary problems of dumping wastes in the ocean? What is the only waste allowed to be ocean dumped?
6. What is a sanitary landfill, and what are the primary concerns with sanitary landfills? How are landfill gas energy projects helping?
7. Understand the 2 concepts that are helping to reduce landfill usage.
8. How are hazardous wastes defined? Explain the concepts of ‘dilute and disperse’ and ‘concentrate and contain’ as they pertain to disposing of hazardous wastes.
9. What is the significance of the Love Canal incident?
10. Know the 4 practices used to dispose of hazardous wastes, and the limitations of each. Which is the most commonly used?
11. Understand alternative methods used to deal with hazardous wastes.
12. What is a half-life of an isotope? What are the 3 types of emissions from isotopes?
13. What is the difference between low level and high-level radioactive waste?
14. How is liquid high level radioactive waste (HLRW) currently stored? Solid? Where is HLRW currently stored?
15. What other options have been considered for dealing with HLRW? Why was Yucca Mtn chosen?
16. Be able to explain the multibarrier concept regarding HLRW.

**Chapter 17: Water Pollution**

1. What is a pollutant? Understand how residence time matters in terms of dealing with pollutant.
2. Understand point and nonpoint sources of pollution; be able to give an example of each.
3. Know the types of water pollutants discussed in class, and what are their origins.
4. In terms of water pollution, distinguish between organic matter and nutrients as pollutants. Understand what is biochemical oxygen demand (BOD) versus eutrophication.
5. How is thermal water pollution bad?
6. What is one method for handling sediment pollution? What about herbicides/pesticides?
7. Know the ways for reducing surface water pollution.
8. What is a contaminant plume? Why is groundwater pollution harder to deal with than surface water? What is probably the biggest contributor of pollution to groundwater systems (think “60 Minutes”)?
9. Why is it important to know the geology of the groundwater system, as well as the identity of the pollutant?
10. Know the 2 ways to treat groundwater pollution that were discussed. Understand what is needed for each treatment process and how each one yields clean water.

**Chapter 18: Air pollution**

1. What are stationary and mobile air pollutants? Primary and secondary?
2. What are the 2 biggest generators of air pollutants?
3. Why was the Clean Air Act & amendments significant? What did it allow for? What is the Air Quality Index?
4. Know the criteria air pollutants discussed in class. What is the primary source of each? Understand the health concerns of each.
5. What is LA smog (photochemical smog) and how is it formed?
6. Explain how can ozone in the atmosphere be both good and bad. Why is the ozone hole bad for us? How does this compare with the effects of ground level ozone?
7. What is the primary result of emission of sulfur dioxide? What does it harm?
8. Explain why particulate matter is an air pollutant. Which is more detrimental, PM2.5 or PM10, and why? What is the Haze Rule?
9. Be familiar with the indoor air pollutants mentioned in class. How is radon bad for our health, considering the half-life of radon is only 4 days? How does CO harm a person?
Presentations
1. What are the primary causes of coral bleaching?
2. Why was Milltown Dam considered a Superfund site and how was it restored?
3. What actions were taken to prepare for a future event like the 2004 tsunami disaster?
4. What damages resulted from the 2008 Chaiten eruption?
5. What is the biggest environmental concern from burning coal in China?
6. Why was there less overall destruction from hurricane Gustav?
7. Which country is following in Haiti’s “steps”, in terms of environmental devastation?
8. What is vermiculite and why is it of concern?
9. What is so significant about the rebuilding of Greensburg, KS, after it was destroyed by tornado?
10. What is aseismic creep?
11. Even though cyclone Nargis was forecast, why was evacuation so poorly executed?
12. What factors are considered when assessing storm intensity and occurrence for predicting trends?
13. What are ways to treat and/or protect structures from destruction by acid rain?
14. What are negative impacts of micro hydropower projects?