Fission and Nuclear Power Plants
Worksheet

First /Last Name: _____

1. What triggers the fission process? Fission is triggered when a slow-moving neutron is absorbed.

   What exactly happens to a nucleus when it fissions? In the fission process, an atomic nucleus is split into two smaller nuclei and free neutrons.

2. Which of the two forces in the nucleus wins to trigger the fission process? The electric force wins. This is the repulsive forces between protons.

3. The fission process produces kinetic energy. According to Einstein, where does this kinetic energy come from? According to Einstein, mass is a form of energy. The fission process results in a loss of mass and this lost mass is converted to KE of the fission fragments.

4. Is the uranium fuel the danger in a nuclear reactor? If not, what is? The fuel is not the danger, it is the radioactive isotopes produced by fission. They emit alpha, beta, and gamma particles.

5. What is the function of the control rods? The control rods are used to slow down the fission rate in a reactor (by taking neutrons) so the reactor does not get too hot.

6. Why is it important to have dependable cooling systems in a nuclear power plant? The spent fuel and the decay products maintain a high temperature and must be cooled in order to prevent damage to the containment structure. Overheating can cause melting of the containment structure; this is referred to as "meltdown".

7. How are nuclear power plants and fission bombs similar? How are they very different? Can a nuclear power plant explode like a nuclear bomb? They both use the fission process to split uranium and produce energy. In a nuclear power plant the uranium is enriched to only about 3% so the fission process is controlled. In a nuclear fission bomb the uranium is enriched up to 90% leading to a runaway fission process. Nuclear power plants cannot explode like a nuclear bomb but they can explode like a chemical (TNT) bomb.

8. The fuel in a fission plant is uranium, a material in limited supply. Would fusion power plants face the same problem? Explain.
No. Fusion fuel is hydrogen which is abundant in seawater.