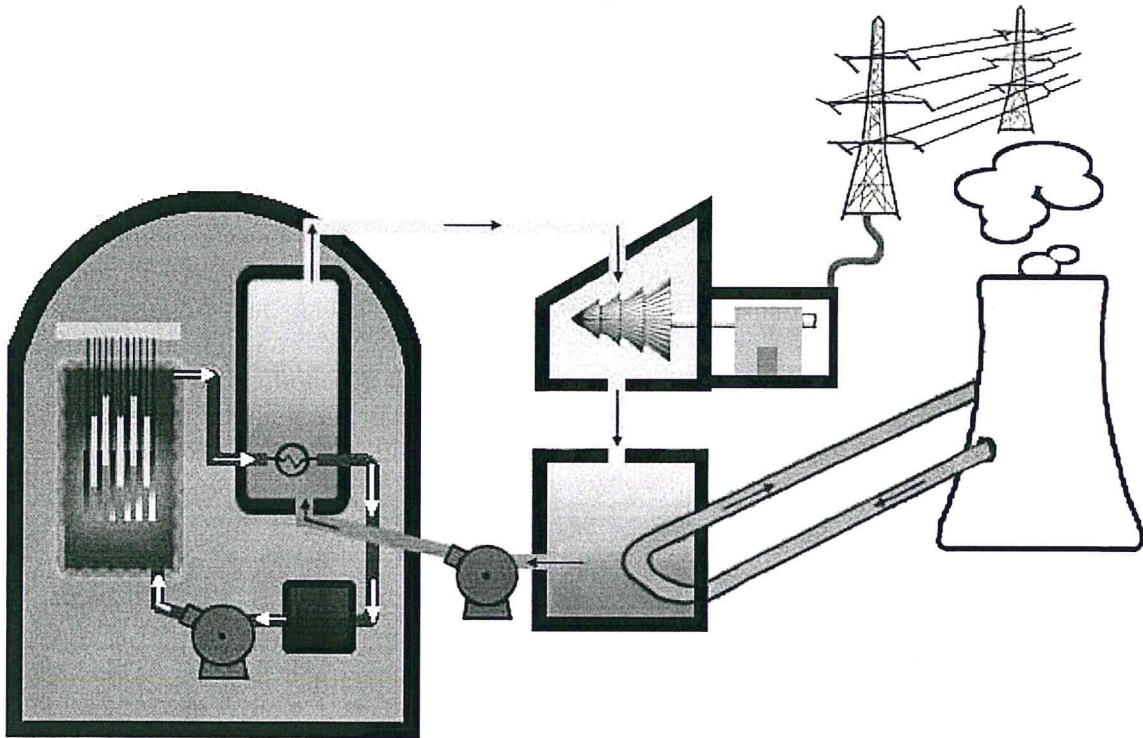


Nuclear Power Plants *Worksheet*

Directions

Many nuclear power plants are dependent upon the fission of enriched U-235. Heat is produced in the reactor when neutrons strike the uranium atoms resulting in a chain reaction. Control rods (yellow) are placed among the fuel rods (gray) to absorb excess electrons and slow down the reaction in the reactor core. Removing the control rods speeds up the reaction by increasing the number of available neutrons. The heat released from the reaction is transferred via a high-pressure water system (dark blue water system) to a secondary circulation system where another source of water is vaporized (the light blue water system). This vaporized water expands causing turbine blades to rotate. The turbine spins a shaft which drives an electric generator producing electricity. The steam, which has now lost energy, is cooled in a condenser and re-circulated throughout the system. Additional cooling takes place in the tall cooling tower on the far right of the diagram. The following diagram illustrates some of the main features of a nuclear power plant. Using the illustration, answer the following questions.



Schematic of a Nuclear Power Plant

Name: _____ Date: _____ Period: _____

Questions

1. Label the following items on the schematic:

Nuclear reactor

Turbine

Control rods

High pressure water system

Cooling system

Electric generator

Cooling tower

_____ 2. The fuel rods are composed of which of the following substance?

A. uranium ore

B. enriched U-235

C. enriched U-232

D. water

_____ 3. The generator's function is to convert.

A. energy of motion to electrical energy

B. steam to water

C. electrical energy to energy of motion

D. liquid water to steam

_____ 4. If the reaction is proceeding too slowly, what should be removed to speed it up?

A. the condenser

B. the turbine

C. the control rods

D. the fuel rods

_____ 5. What causes the turbine blades to rotate?

A. removing the control rods

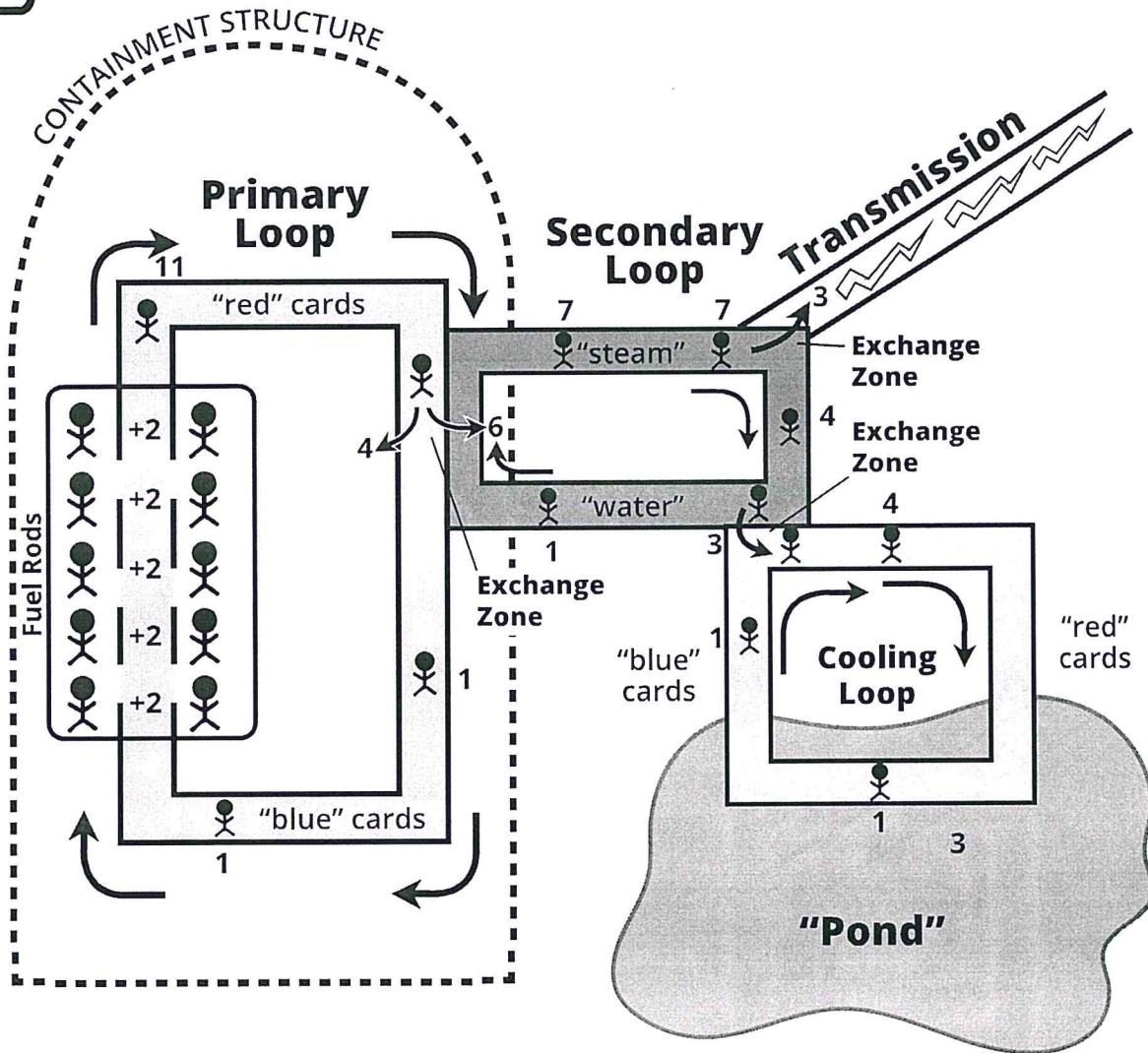
B. the condensation of the steam

C. the vaporization of the water

D. the expansion of the vaporized water



Nuclear Power Plant Simulation Summary



1. Explain how energy is transformed in a nuclear reactor by pretending you are an energy chip in the primary loop. In a few sentences, describe where you start, and how you might transfer through the power plant at all of the different exchange zones.
2. In part two of the simulation, energy is "dropped" by the circulating water in the primary loop. Not all of the energy in this water is passed to the secondary loop and beyond. Explain why you think this occurs.
3. Identify one challenge that nuclear facilities must combat in order to keep the chain reaction operating under control. Explain how facilities keep this challenge in check.