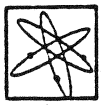
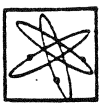
STUDENT NAME_____ COURSE_____ HOUR_____



Nuclear Energy

"TECHNOLOGY"

L. F. BACKUS



Nuclear Energy

Nuclear power plants produce electricity much the same way as fossil-fuel generating plants. The basic process is the creation of steam to spin a turbine and drive an electric generator. The generating equipment is similar at all thermal power plants; the major difference is nuclear power's method of creating steam.

At nuclear plants, a nuclear reactor takes the place of a combustion boiler. The heat that produces the steam comes from the energy released during fissioning (splitting the atoms) of uranium fuel, rather than from burning a fossil fuel such as coal.

A controlled nuclear chain reaction takes place in the reactor as neutrons from one splitting atom strike other atoms, causing them to split and release heat energy. This reaction can be started, controlled and stopped by movable control rods that absorb the released neutrons.

The chain reaction begins as the control rods are withdrawn from the reactor core; neutrons are freed and fissioning begins to create heat. A control rod, inserted into the reactor core, acts as a blotter to absorb free neutrons and slow the fission process. The chain reaction stops and production of electricity halts when workers insert all rods.

In 1982, nuclear plants produced 44.5 percent of NSP's electric generation.

In Wisconsin about 40% of the electrical energy is produced by the nuclear reactor.

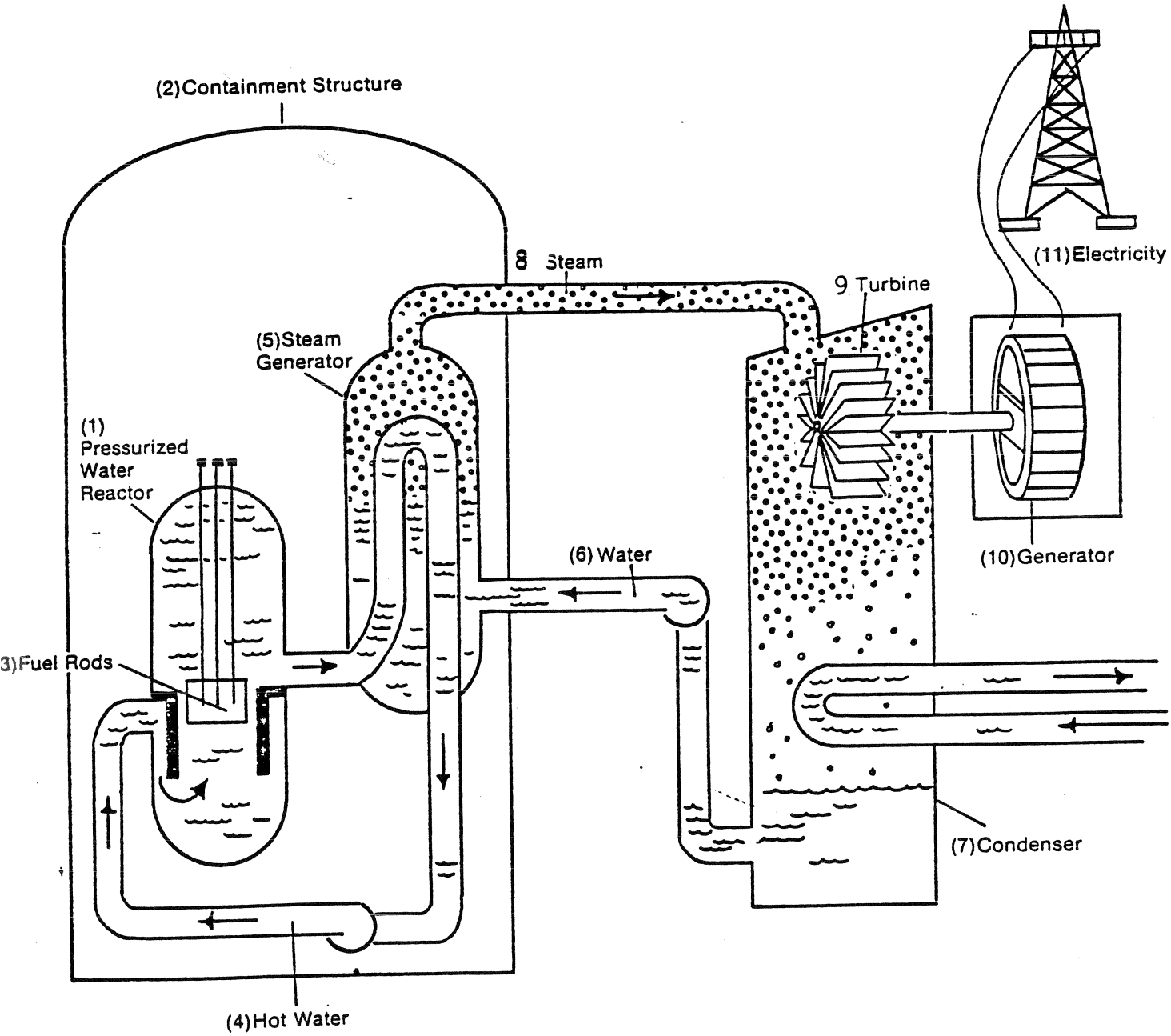
Pressurized Water Reactor Nuclear Power Plant

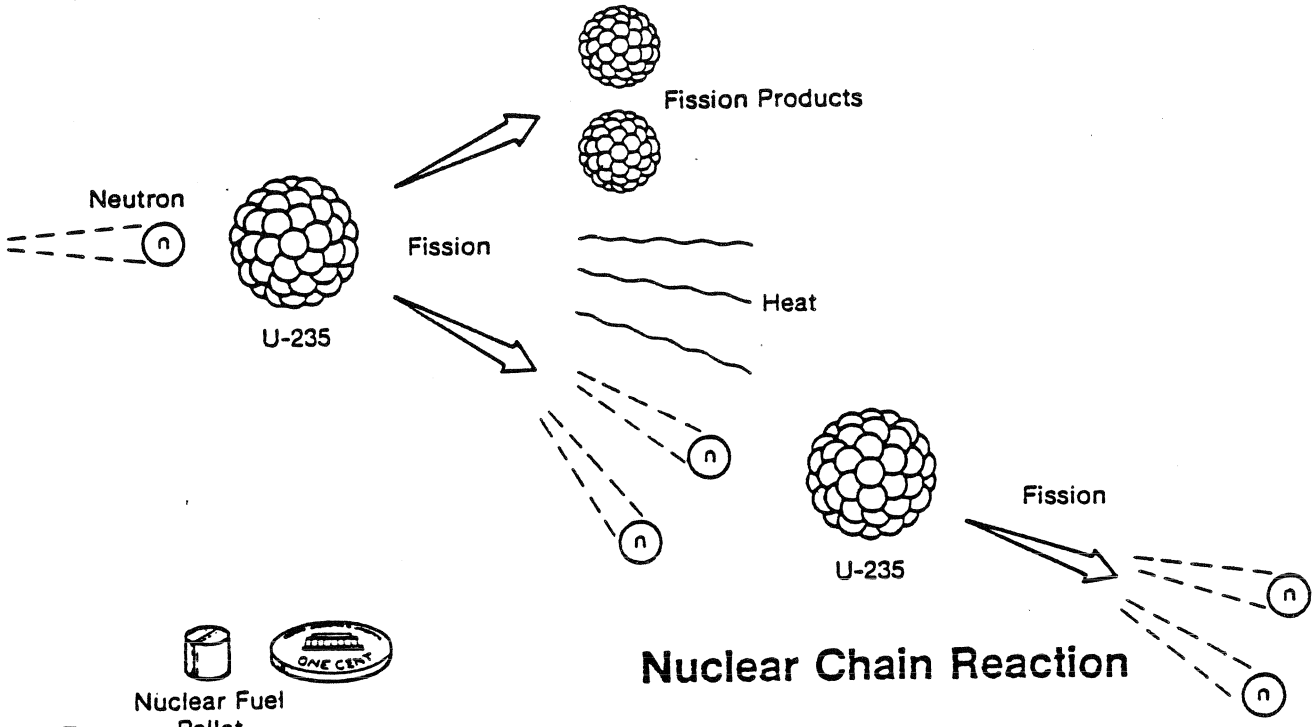
One type of nuclear power plant is the pressurized water reactor (1). In the containment structure (2), water—under pressure to prevent boiling—flows through the reactor where the nuclear chain reaction in the fuel rods (3) heats it to approximately 600 degrees Fahrenheit. This hot water (4) is pumped to the steam generator (5), or heat exchanger, where the cooler water (6) flowing in from the condenser (7) becomes steam (8). The steam drives a conventional steam turbine (9). The condenser converts used steam back into water after it passes over the blades of the turbine, and the water recirculates on the outside of the steam generator tubes. The steam turbine turns the electric generator (10) to produce electricity (11), which reaches the customer through substations and power lines.

DIAGRAM IS ON THE NEXT PAGE

This is the type of nuclear reactor used in this computer program. If you understand the basic design of the reactor it has been proven your scores will be higher.

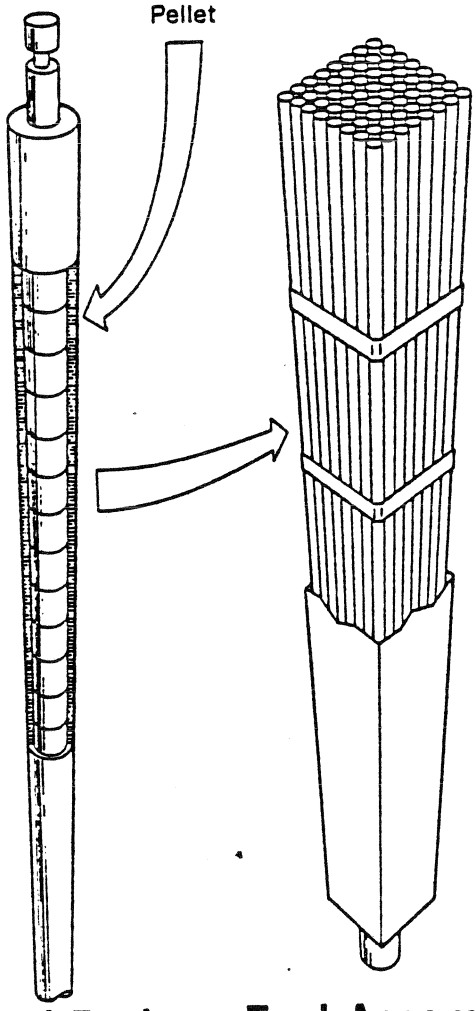
Pressurized Water Reactor (PWR)





Nuclear Chain Reaction

Nuclear Fuel Pellet



Fuel Rod Fuel Assembly

NOTE: BE SURE TO CHECK THE EVALUATION PAGE (NEXT PAGE) OF THIS PACKAGE BEFORE YOU START THIS PACKAGE

For this package use the Commodore 64 computer

1. Sign out the computer disk "NUCLEAR REACTOR" be sure to sign it back in when you return it.
2. Turn the computer on and load the program:
   A. Turn keyboard, drive and monitor on.
   B. Type LOAD "NUCLEAR REACTOR" ,8 and push the Return key. (program must be in the drive)
   C. When Ready Appears on the screen type RUN then push the return key.
3. When the MENU appears press key 2 for student instructions and "RETURN".
4. Follow directions on the program

EVALUATION SHEET NUCLEAR REACTOR

NAME_____ HOUR_____

Activity	Possible Points	Earned points
1. THE INSTRUCTOR MUST SEE THESE VALUES ON THE COMPUTER MONITOR (reactor must be run for at least 80 days) Average power output value in KW. all areas listed under leakage must have a value of 0 L/day 1750 - 2000 KW = 20 1300 - 1749 KW = 18 1000 - 1299 KW = 16 750 - 999 KW = 14 500 - 749 KW = 10 300 - 499 KW = 4 200 - 299 KW = 1	1 - 20	_____
2. Game ending comment (must show instructor on the computer monitor) Value of Energy Produced $_____	60	_____
3. Study Questions from next page	14	_____
TOTAL	94	_____

NAME_____CLASS HR. _____

Study Questions

1. What does primary coolant do? (2 points)

2. What does secondary coolant do?(2 points)

3. Describe in your own words the operation of a pressurized water reactor. (10 points)