

Joseph Specht

NPRE 247

1) Max k w/ ratio =  $578.0 N_{\text{Mod}} / N_{\text{Fuel}}$

Max k - 1.046

2) side length = 581.257 cm

3) Fuel/H<sub>2</sub>O ratio - .588235

Fuel/D<sub>2</sub>O ratio - .003436

Fuel/Be ratio - .005236

Fuel/C ratio - .002398

4a) k infinity - 1.097

b) k eff - 0.8845

5) Insertion - \$0.08187

6) A decrease in the boiling rate would increase reactivity as the water is now a liquid, which has better thermal transfer properties than gaseous steam. This allows it to remove more heat from the reactor, which makes the alpha,Temp go up as the cooler the reactor, the high alpha,Temp. Also, if boiling is too high, H gas will be produced, which could oxidize the fuel and explode.

7) Xe-135 should have a large cross section because it is a large nucleus and it has 81 neutrons, which is 1 away from the special full shell number of 82 neutrons, which would increase its cross section.

8) Xe-135 would not produce much feedback as the cross section for Xe-135 at high neutron energies is low compared to the fast fission cross sections of the fuel. However, the cross section is still existent, so it will slightly take away from fast fission.