First Hour Exam
NEEP-423
Oct. 4, 1999

Points	Question
16	1.) a) What is the most popular form of fuel for fission reactors today? b) What is the coolant and the approximate outlet temperature for the following reactors? • LWR's • Graphite Moderated Reactors • LMFBR's
20	2.) a.) What is the single largest drawback of unalloyed metallic U fuel for power reactors and why is it a problem? b.) Give 3 other reasons why reactor vendors switched from metallic U to other fuels for light water reactors in the 60's and 70's
15	3.) Give 3 advantages of IFR's over current LWR's
18	4.) a) Why don't we use Stainless Steel cladding in LW power reactors? b.) Why don't we use Aluminum cladding in LW power reactors? c) Why don't we use Zircalloy cladding in LMFBRs?
31	5.) Country X is suspected of making weapons grade ^{235}U (i. e., >90% ^{235}U) You are part of an IAEA observation team and your intelligence network tells you that 20 canisters of UF_6 (each container has 100 kg of natural UF_6) were seen going into the plant. Furthermore the plant has a 3 MW_e electrical line going into it which is used 24 hr's a day. Exactly 1 year later you see them removing the tails which now contain 0.3% ^{235}U. Could they have made enough weapons grade ^{235}U (10 kg of >90% ^{235}U) for a bomb? Note : • At. Wt. of F is 19. • They used a gaseous diffusion process which requires 3 MWh/SWU

$$V(x_i) = (2x_i - 1)\ln\left(\frac{x_i}{1 - x_i}\right) \qquad S = V(x_p) + \frac{W}{P}V(x_w) - \frac{F}{P}V(x_f)$$