NE 795-010 Advanced Reactor Materials and Materials Performance

Exam 1

1. Describe some aspects of the inherent safety of sodium cooled fast reactors as demonstrated in EBR-II. (6 pts)
2. Why is pure metallic alpha U unsuitable for use as a nuclear fuel? (6 pts)
3. Why must metallic fuel systems include a relatively low smear density and large plenum? (8 pts)
4. Do metallic fuels swell isotropically? Why or why not? (6 pts)
5. What is constituent redistribution in metallic fuels? Why does it occur? What are the concerns associated with it? (10 pts)
6. How does the thermal conductivity vary as a function of burnup in metallic fuels? What phenomena drive this behavior? (6 pts)
7. What is FCCI? What are the adverse effects of FCCI? (6 pts)
8. What are the primary fuel and cladding species participating in FCCI? (8 pts)
9. Briefly describe the pyroprocessing of metallic fuels, including benefits. (6 pts)
10. Name five phenomena in metallic fuel that need to be accurately described for predictive fuel performance modeling. (6 pts)
11. Describe restructuring in MOX fuels. (8 pts)
12. What are two phenomena related to elevated Pu concentration in MOX fuels? (6 pts)
13. What is JOG? Why does it occur? (6 pts)
14. What allows for sodium dissolution corrosion of cladding/structural components? (6 pts)
15. What role does oxygen play in the corrosion of structural components with sodium coolant? (6 pts)