Swelling

- **First discovered in 1986-UK**

- **Occurs when vacancies collect into clusters which grow and cause the material to expand**

- **Has been observed in many pure metals and alloys (Mg, Al, V, Fe, Co, Ni, Cu, Nb, Mo, Ta, W, Re, and Pt) and dozens of alloys.**

- **Generally occurs between 30 and 50% of the absolute melting point.**

(Figures)

- **Usually try to keep swelling <<10% (i.e., 1-2%)**

- **Limits the operating life to 2-3 FPY's in austenitic steels and 5-7 FPY's in ferritic steels.**