

DESIRED CORROSION PERFORMANCE

- Repository performance strongly dependent on WP integrity
- No widespread corrosion penetration of Alloy 22 wall during first 10,000 y
- Localized corrosion likely too detrimental
- Uniform corrosion rate should be very small

C.R. $\ll 2 \mu\text{m/y}$ (= 20 mm / 10,000 y)

THE EXTRAPOLATION CHALLENGE

- WP corrosion performance relies on passivity
- Empirical evidence is short (~100 y) compared to desired goal
- Unprecedented extrapolation gap

UNIFORM CORROSION

- Multi-year gravimetric corrosion rate tests with Alloy 22 in simulated repository environments indicate C.R. < 0.1 $\mu\text{m}/\text{y}$
- Short-term electrochemical tests also indicate rates < 0.1 $\mu\text{m}/\text{y}$
- Temperature dependence of C.R. uncertain. Activation energy ~ 30 kJ/mole suggested.

LOCALIZED CORROSION

- Present repository performance analysis models adopt critical potential criterion for support of localized corrosion
- Much information on open circuit potential (OCP) and repassivation potential values for performance analysis is derived from cyclic polarization tests (new information now emerging)
- Crevice corrosion not sustained at ~ 100 °C and expected OCP when chloride ion and beneficial anion content was comparable
- Concern about detrimental trace substances (e.g. Pb)
- Long time frame, large surface area issues.

4