



Uranium Mining: relating chemistry to the “real” world

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Uranium ore

Carnotite

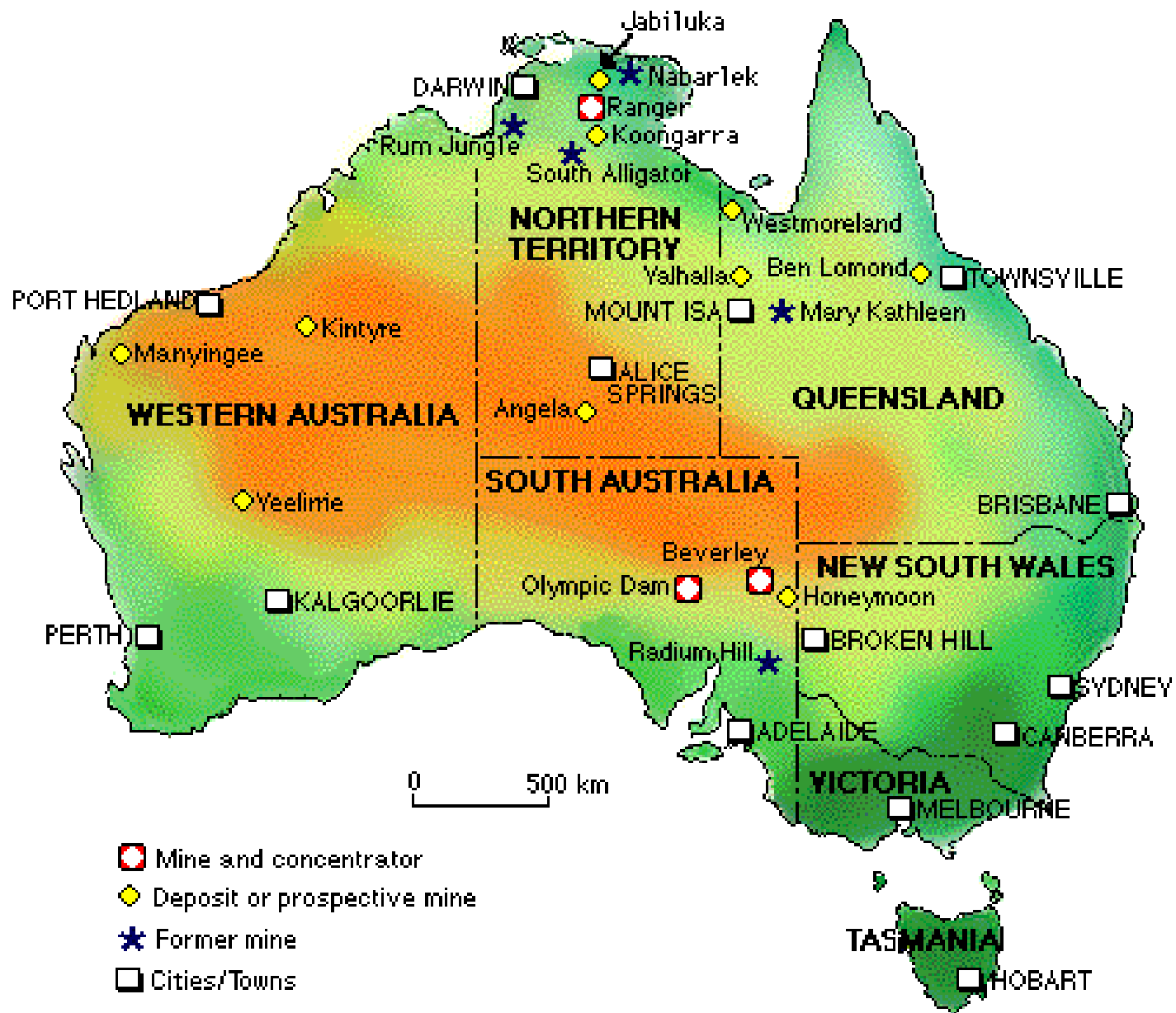


URANINITE CRYSTALS



An alternative to carbon-based fuels?





Exploration



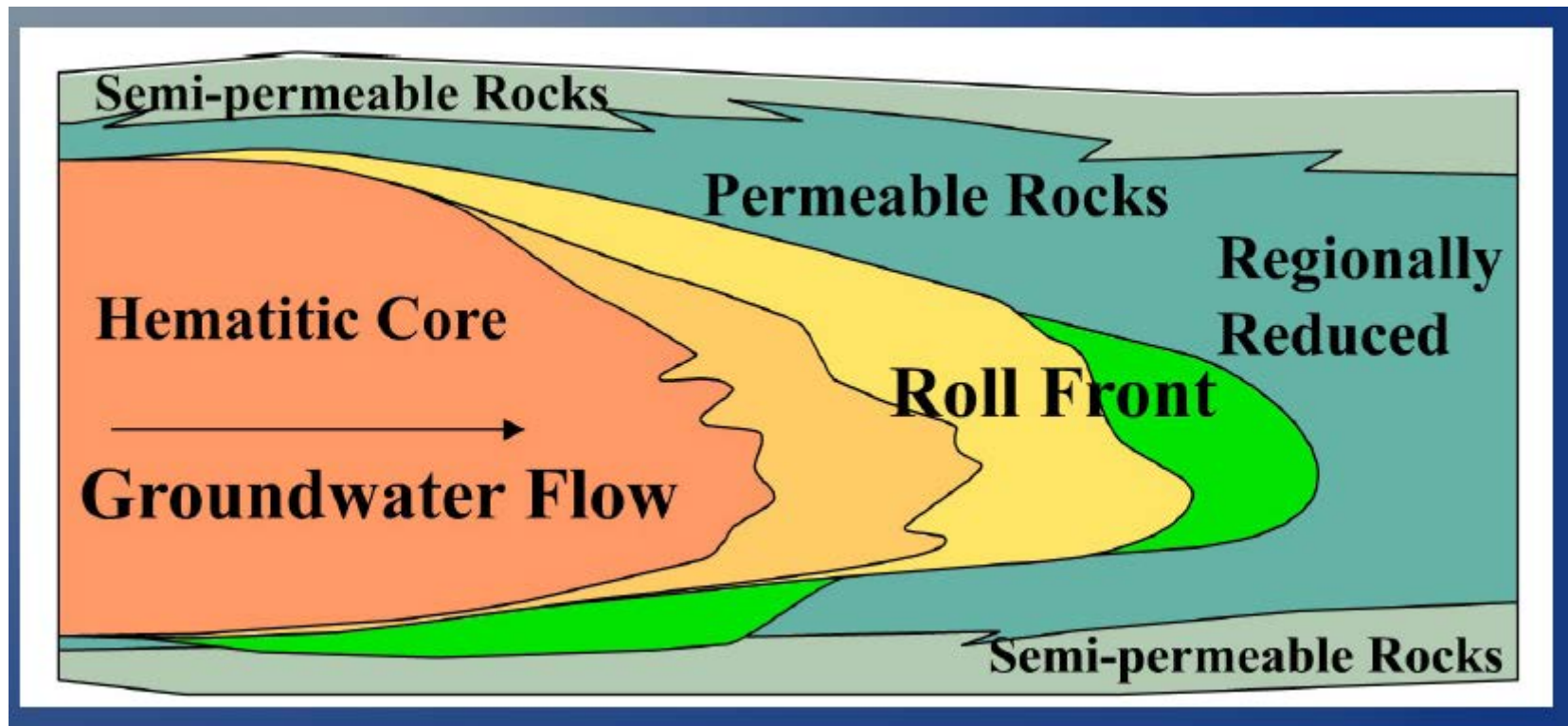
Porous sand in paleo river channel

110 – 120 m deep

Area - 900 x 450 m



U Roll Front Schematic



Oxidation Reduction Conditions

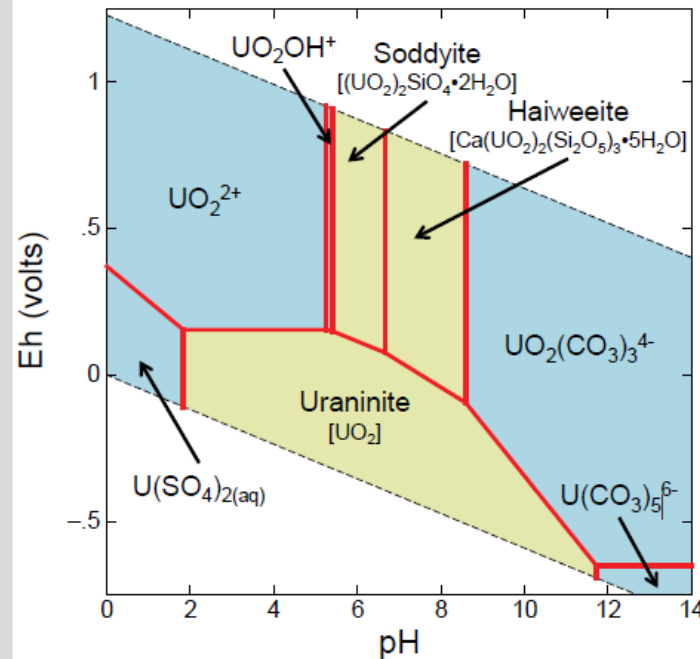
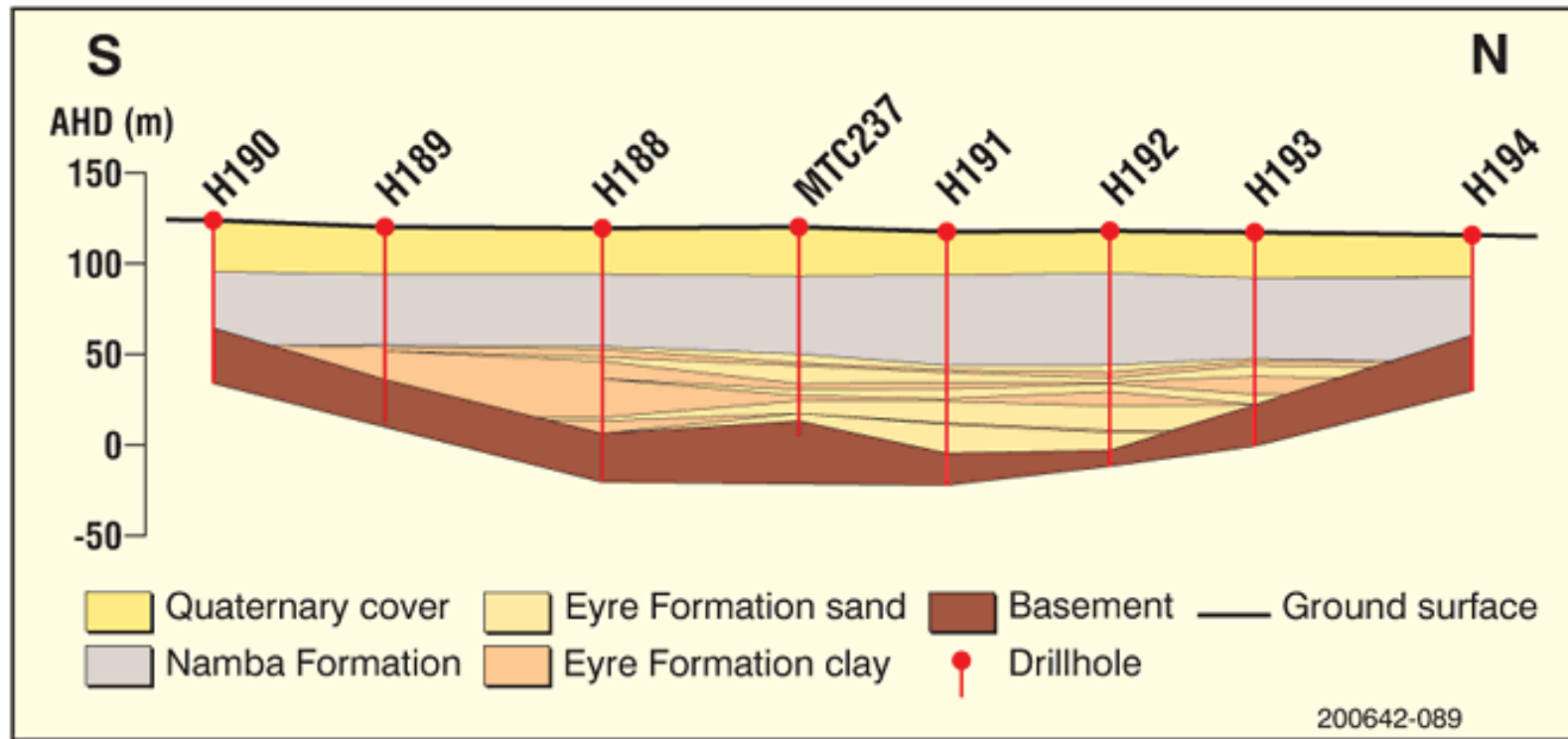


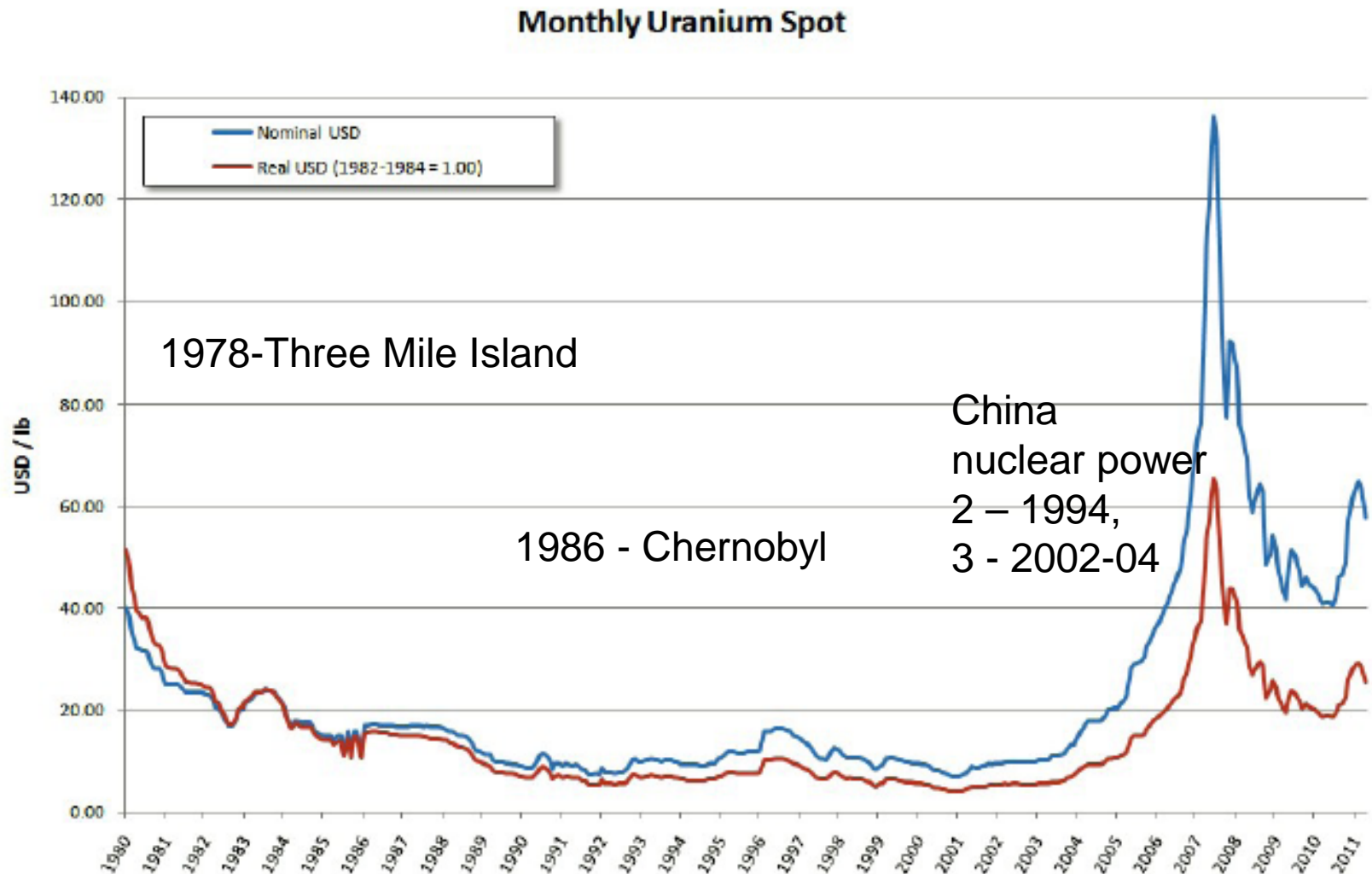
FIGURE 3.1 Eh-pH diagram for the U-O₂-H₂O-CO₂ system at 25°C assuming $P_{\text{CO}_2} = 10^{-3.5}$ atm (equilibrium with atmospheric CO₂) and the median major ion composition of groundwater (Table 8.8 in Langmuir, 1997). The fields shaded blue represent species dissolved in water (aqueous species) while the fields shaded tan represent solid mineral phases. The diagonal dashed lines at the top and bottom of the figure delineate the stability field of liquid water. Thermodynamic data are from Grenthe et al. (1992) and Guillaumont et al. (2003). U(IV)-S(II) species were not considered in this diagram. SOURCE: Committee generated using The Geochemist's Workbench[®] (Bethke, 2010).

Cross-section of the site



Cross-section of the Yarramba Palaeochannel.

Uranium spot prices



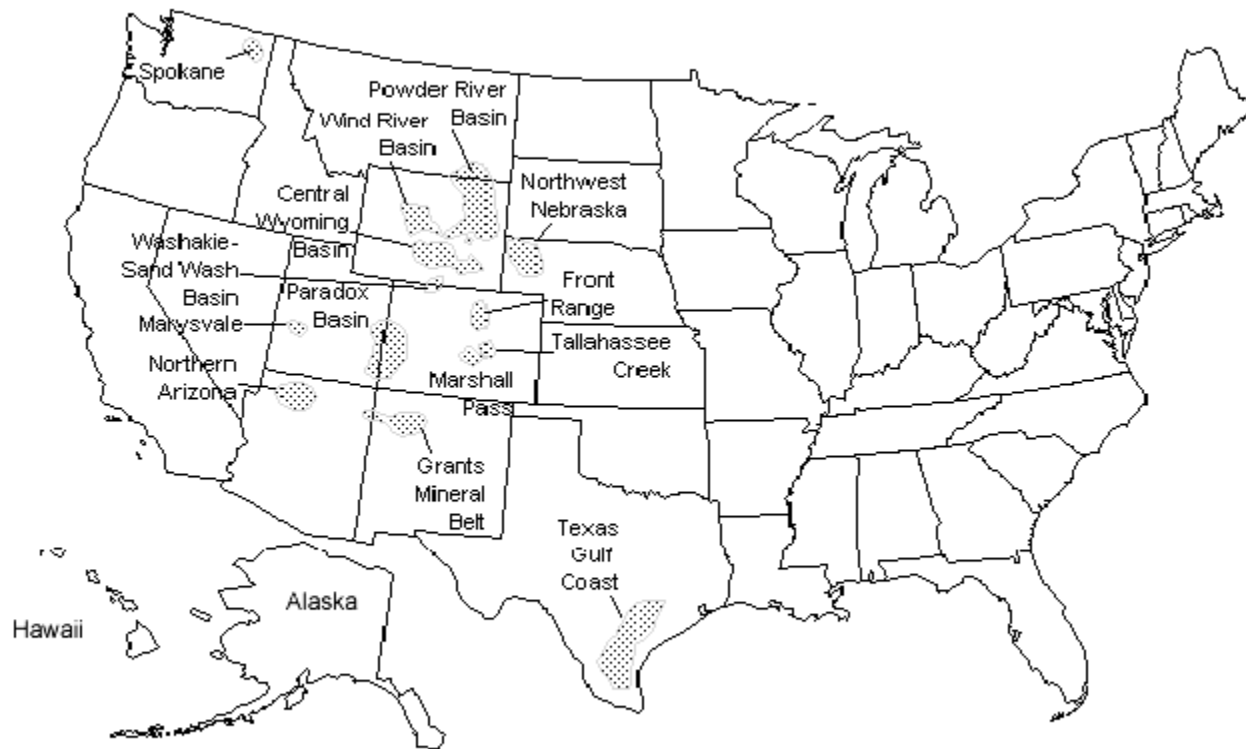
Calculate the value of the ore

1 tonne – 2200 pounds,

Sand unit	Ore (tonnes)	Grade (%U ₃ O ₈)	Tonnes U ₃ O ₈	Pounds U ₃ O ₈	Value 2007	Value 2011
EBS-5	89,000	0.13				
EBS-4	45,000	0.168				
EBS-3	140,000	0.37				
EBS-2	410,000	0.28				
EBS-1	530,000	0.283				
Total						

In the United States

Major U.S. Uranium Reserves



Sources: Based on U.S. Department of Energy, Grand Junction Project Office (GJPO), National Uranium Resources Evaluation, Interim Report (June 1979) Figure 3.2; and GJPO data files.

Uravan, CO 1975

