Calculation Recd.

UNOCAL 76

PREPARED BY	CHECKED BY	DATE	PAGE OF

SUBJECT	W O/A.F.E. NO

Method used to calculate grams of radionuculide per gram of material

$$PCi/gm \Big/ (SpA \times 1\times10^{12}) = grams/gram$$

$$\Rightarrow \boxed{g/L \times (SpA \times 10^{12}) = PCi/L}$$

PCi/gm = Concentration reported by Barringer laboratories.

SpA = Specific activity in Curies/gram (multiplied by 10^{12} to convert to picocuries)

$SpA(U_{238}) = 3.46\times10^{-7}$ Ci/g

Example: U = 25.22 ppb U_{234}/U_{238} activity = 1.546

= 25.22 ug/l

= 25.22×10^{-6} g/l

Assume: Uconc $\propto$ activity $[U_{234}] = 1.546\,[U_{238}]$

$U = [U_{234}] + [U_{238}] = (1+1.546)[U_{238}]$

$[U_{238}] = \dfrac{25.22\times10^{-6}\ g/l}{2.546} = 9.906\times10^{-6}$ g/l

U_{238} = 9.906×10^{-6} (g/l) $\times\ 3.46\times10^{-7}$ Ci/g $\times 10^{12} = 3.4$ PCi/l (U_{238})

activity ratio $\dfrac{U_{234}}{U_{238}} = 1.546$, $U_{234} = 1.546\,U_{238} = 1.546\times3.4 = 5.2992$ (U_{234})

~~Utotal~~ = $U_{234} + \cancel{U_{235}}^{0} + U_{238} = (3.4+5.2992) = 8.727$ PCi/L

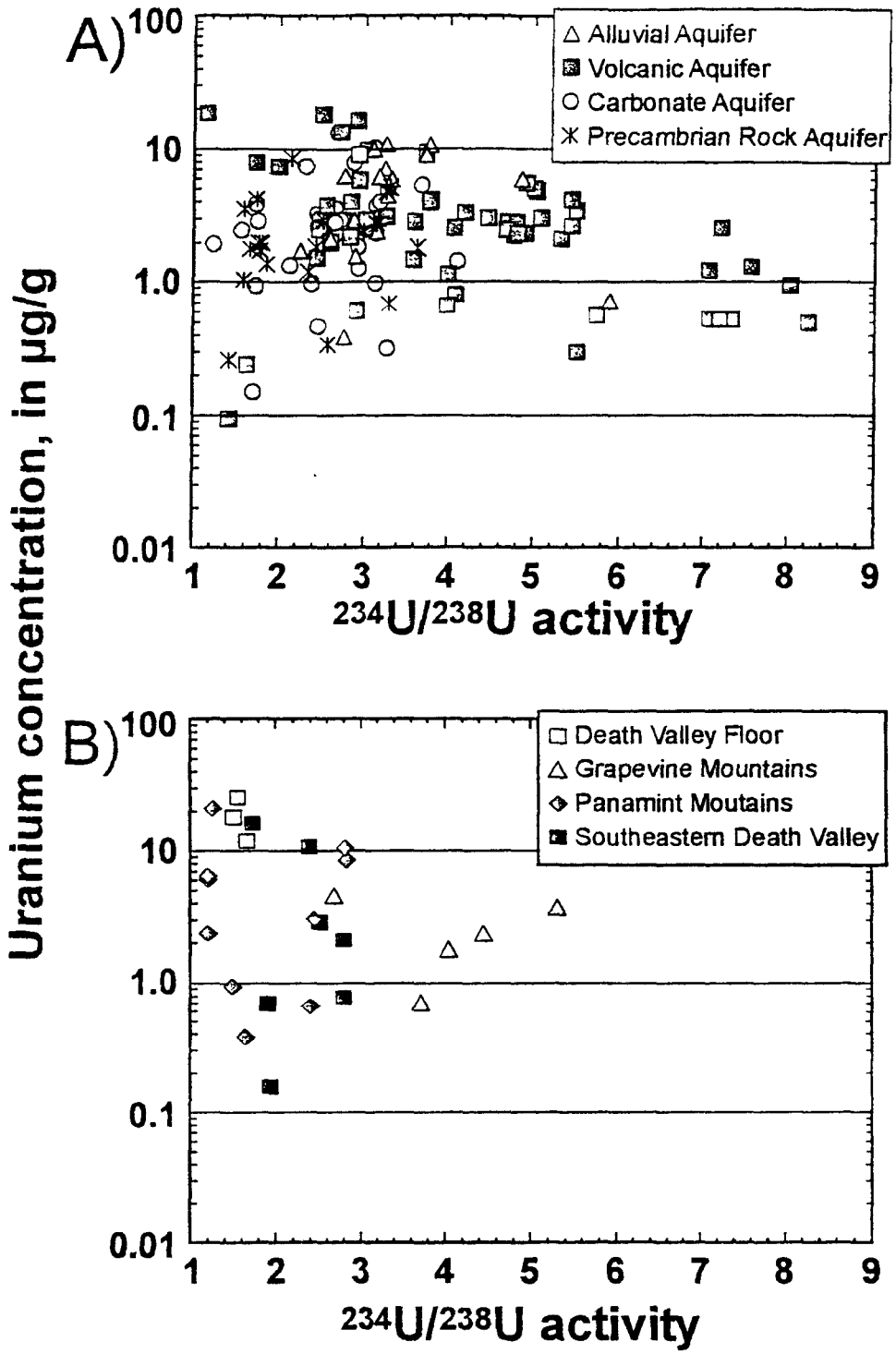

Figure : Plots of uranium concentrations versus $^{234}U/^{238}U$ activity ratios for saturated-zone waters. A) Regional ground water in the Yucca Mountain vicinity (from Paces and other, 1998). B) Death Valley springs. Southeastern Death Valley category includes Navel Spring and Upper Navel Seep, Willow Spring, Salisbury Spring, Ibex Spring, Saratoga Spring, and Owl Hole Spring.

Plate 16. Uranium Concentrations Versus $^{234}U/^{238}U$ Activity Ratios.