The cost of reclamation of the environmental impacts of uranium mining and milling

Peter Diehl

World Information Service on Energy Uranium Project

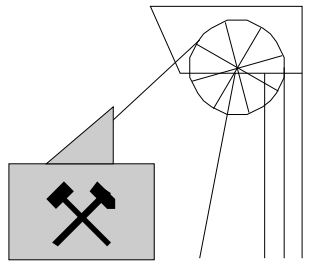
Praha, March 28, 2006

Rössing, Namibia (T.Siepelmeyer)

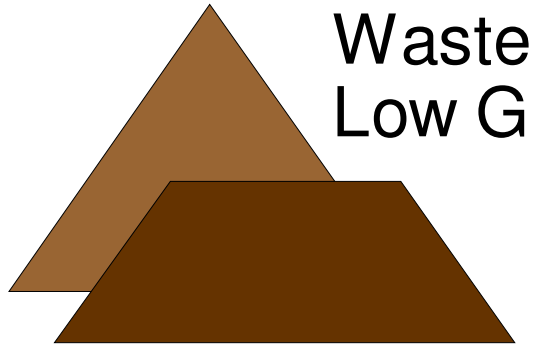
Hamr, Czech Republic, 1995

Nuclear Fuel Production

Uranium Mine



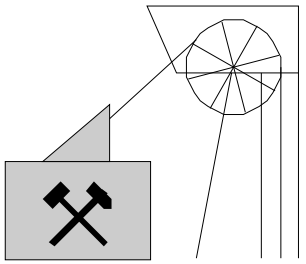
Uranium Ore

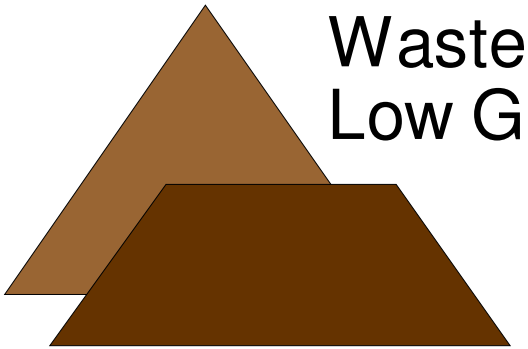


Waste Rock,
Low Grade Ore

Nuclear Fuel Production

Uranium Mine

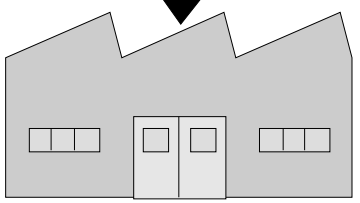


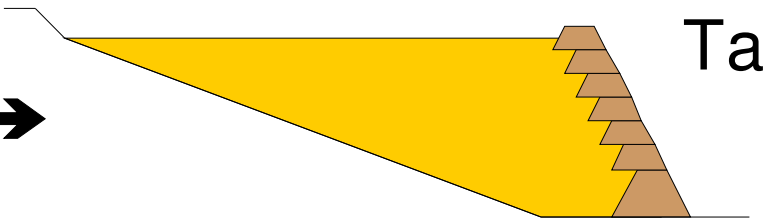


Waste Rock,
Low Grade Ore

Uranium Ore

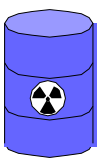
Uranium Mill





Tailings

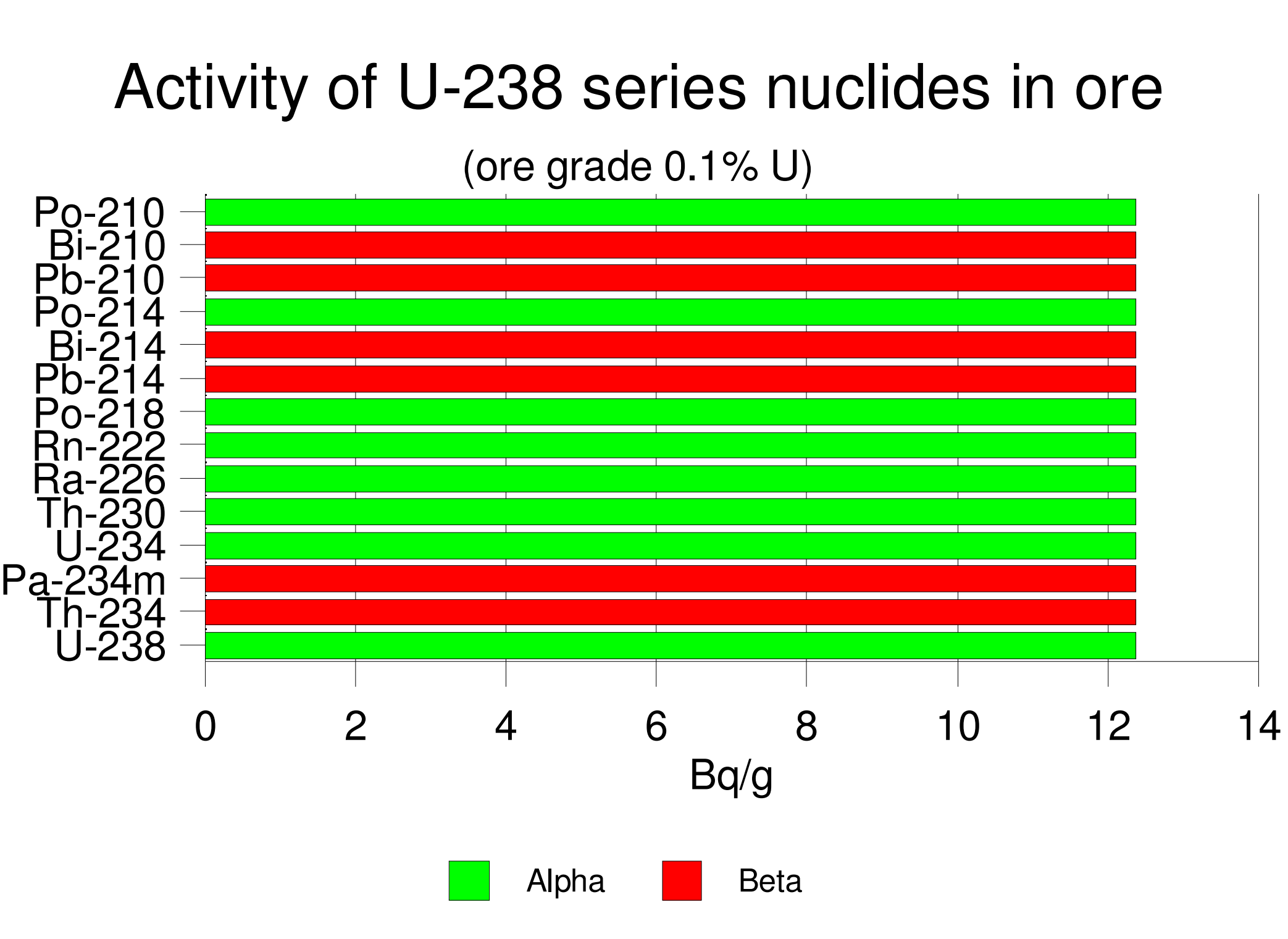
Yellow Cake
(U_3O_8)

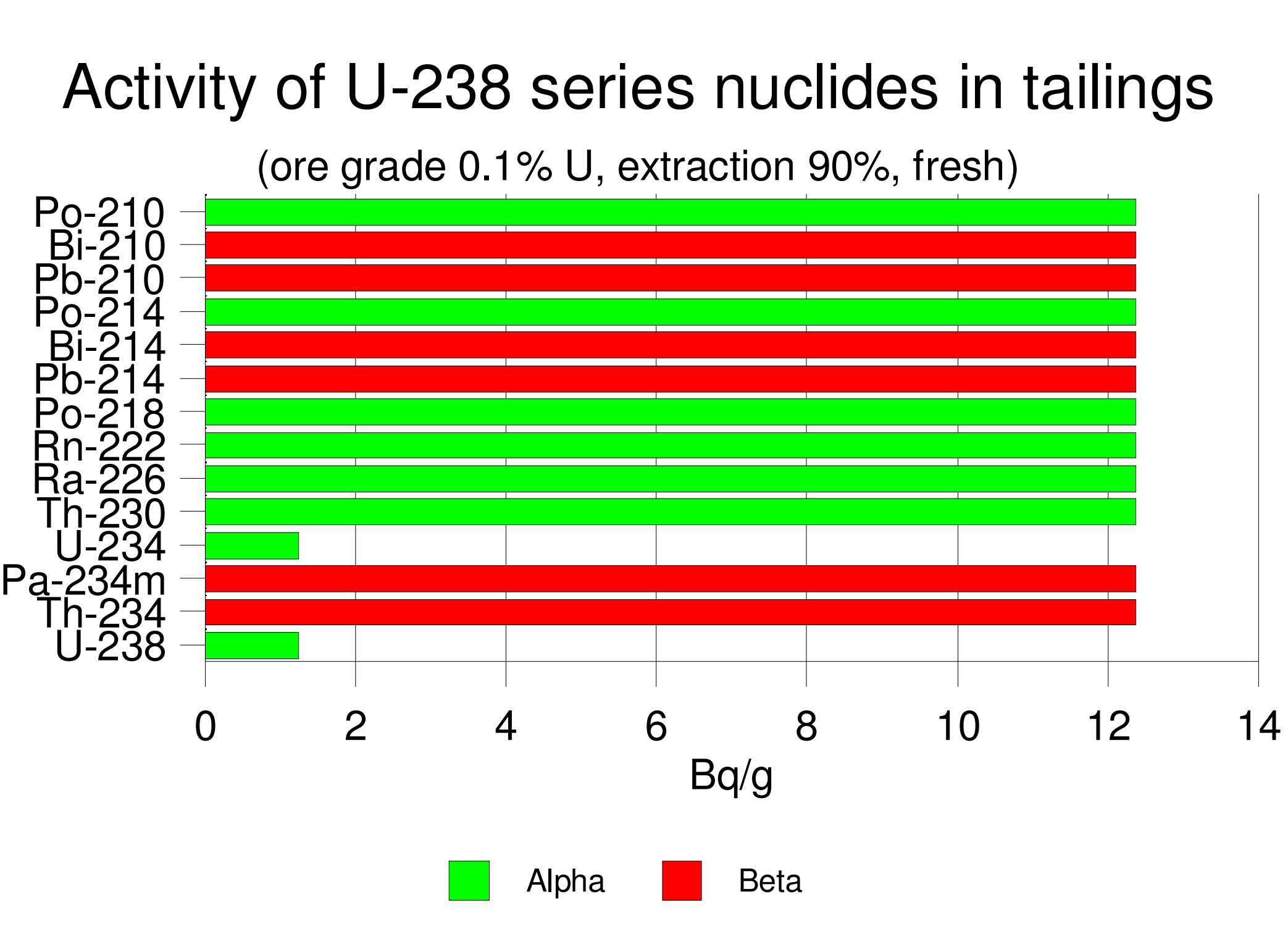


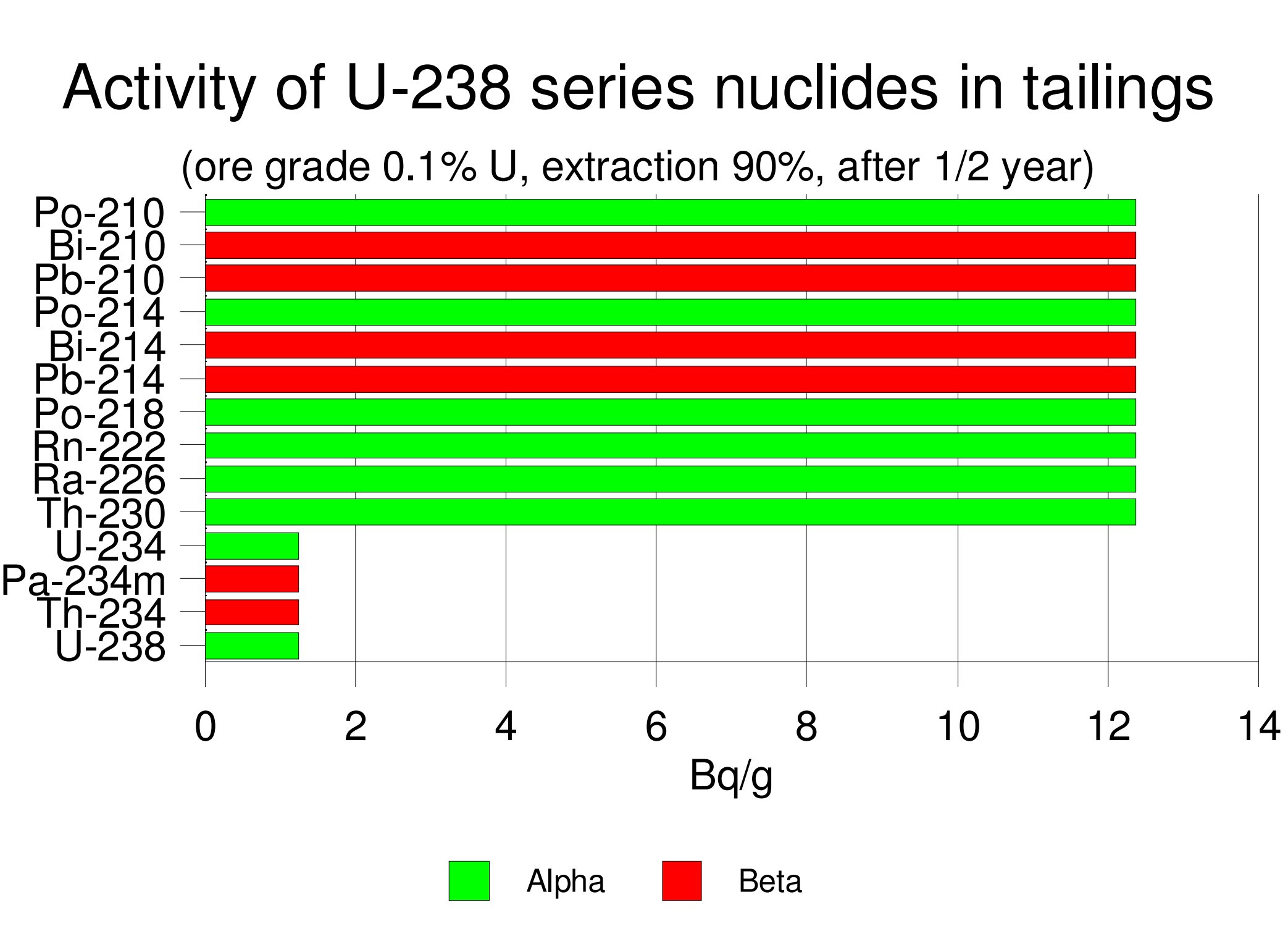
Ronneburg, Thuringia, Germany, 1990

Decommissioned Uranium Mill, Mounana, Gabon, 2004 (Res Gehriger)

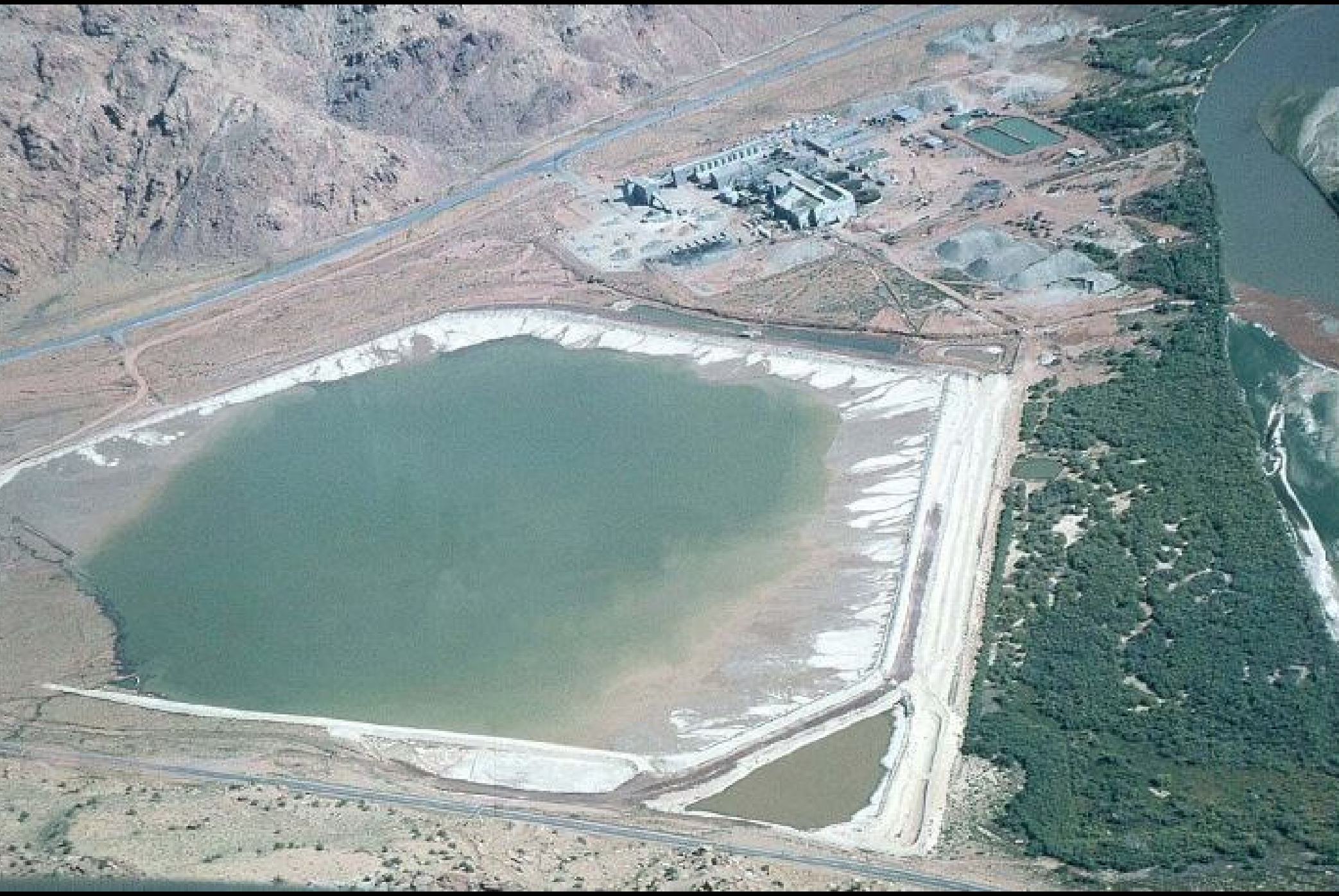
Culmitzsch, Thuringia, Germany, 1990 (M.Beleites)


Activity of U-238 series nuclides in ore
(ore grade 0.1% U)
Po-210
Bi-210
Pb-210
Po-214
Bi-214
Pb-214
Po-218
Rn-222
Ra-226
Th-230
U-234
Pa-234m
Th-234
U-238
0
2
4
6
8
10
12
14
Bq/g
Alpha
Beta


Activity of U-238 series nuclides in tailings
(ore grade 0.1% U, extraction 90%, fresh)
Po-210
Bi-210
Pb-210
Po-214
Bi-214
Pb-214
Po-218
Rn-222
Ra-226
Th-230
U-234
Pa-234m
Th-234
U-238
0
2
4
6
8
10
12
14
Bq/g
Alpha
Beta

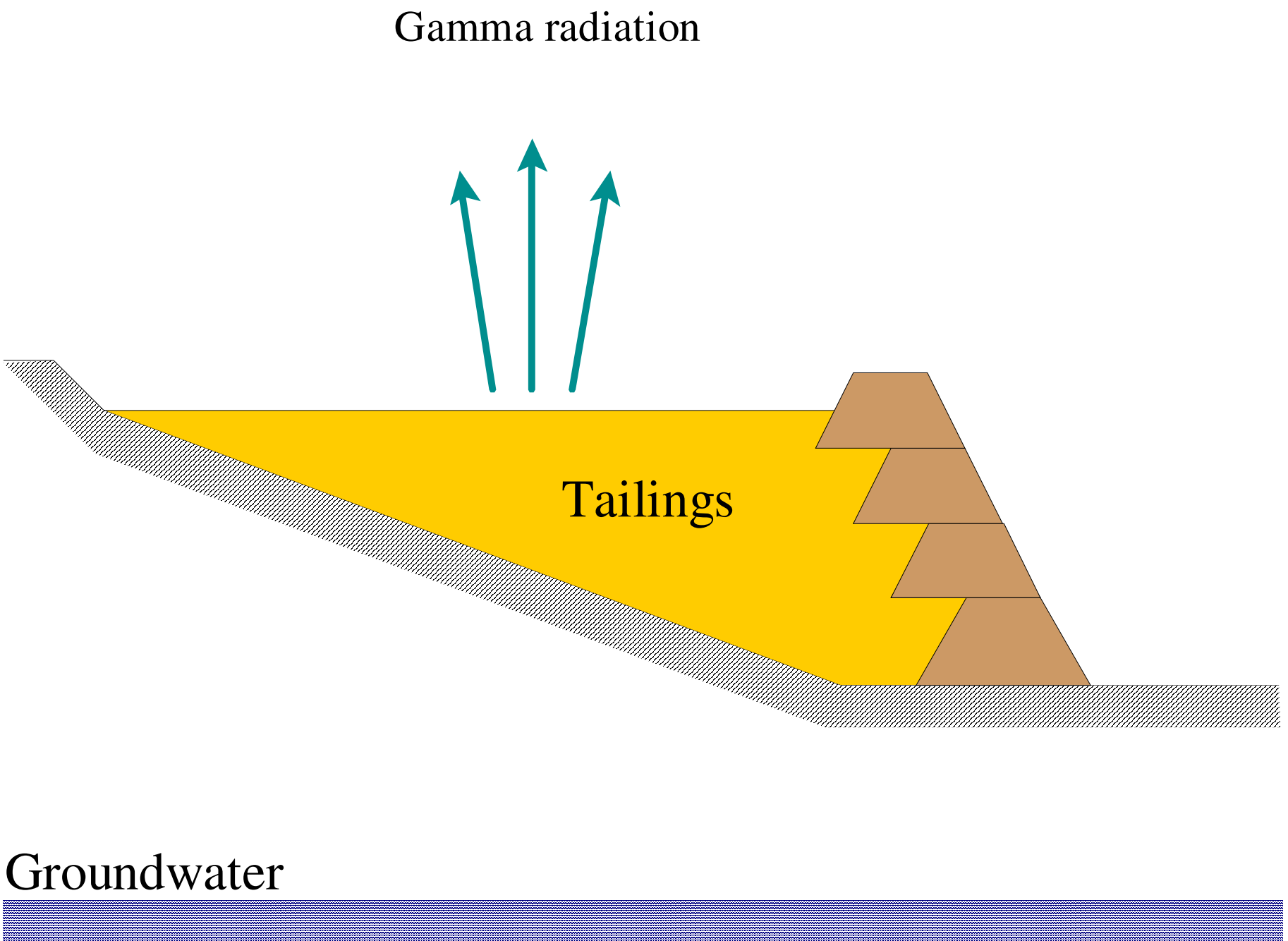

Activity of U-238 series nuclides in tailings
(ore grade 0.1% U, extraction 90%, after 1/2 year)
Po-210
Bi-210
Pb-210
Po-214
Bi-214
Pb-214
Po-218
Rn-222
Ra-226
Th-230
U-234
Pa-234m
Th-234
U-238
0
2
4
6
8
10
12
14
Bq/g
Alpha
Beta

Mounana, Gabon, 2004 (Res Gehriger)

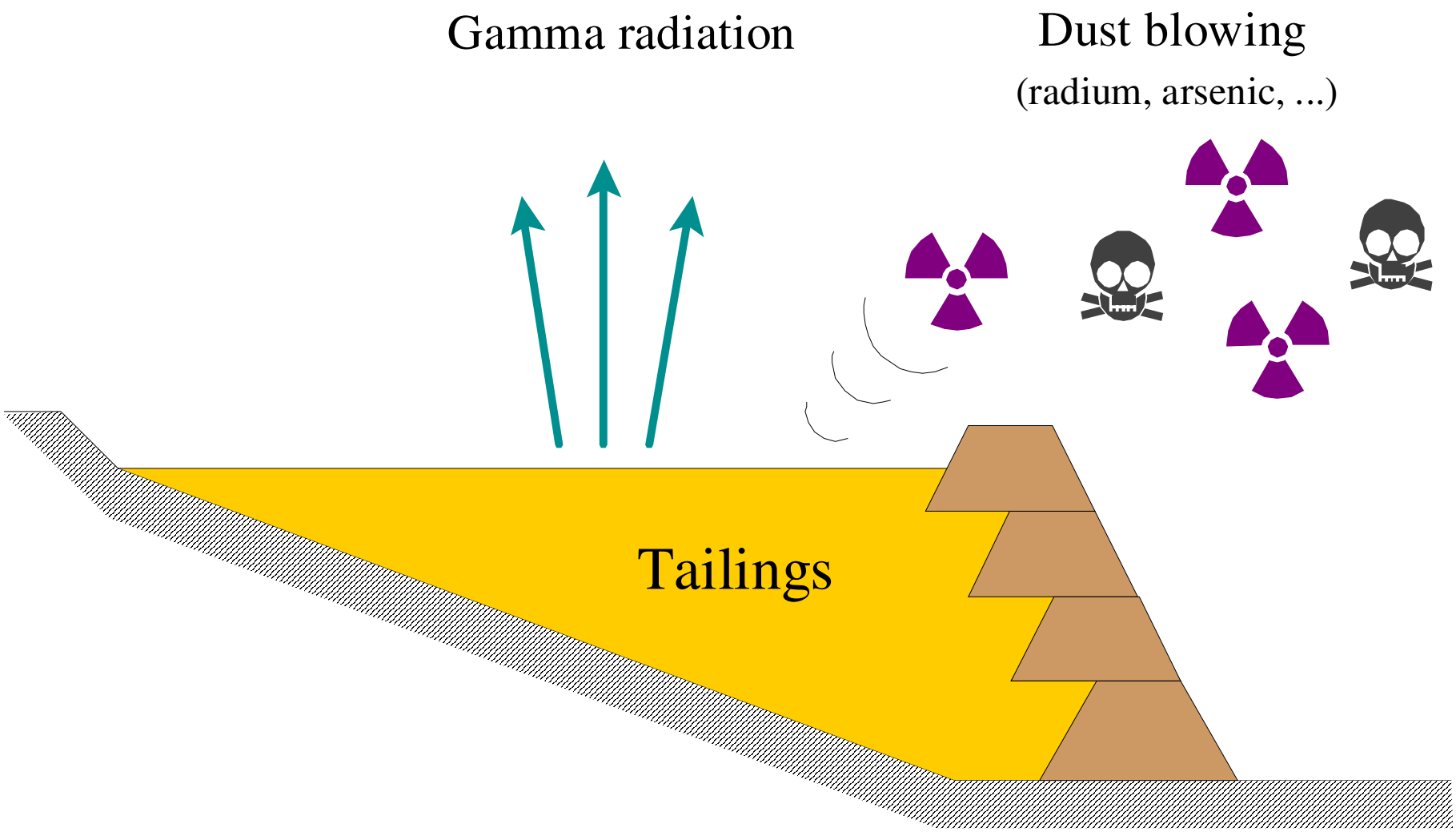


Atlas tailings, Moab, Utah, USA, 1966 (U.S. DOE)

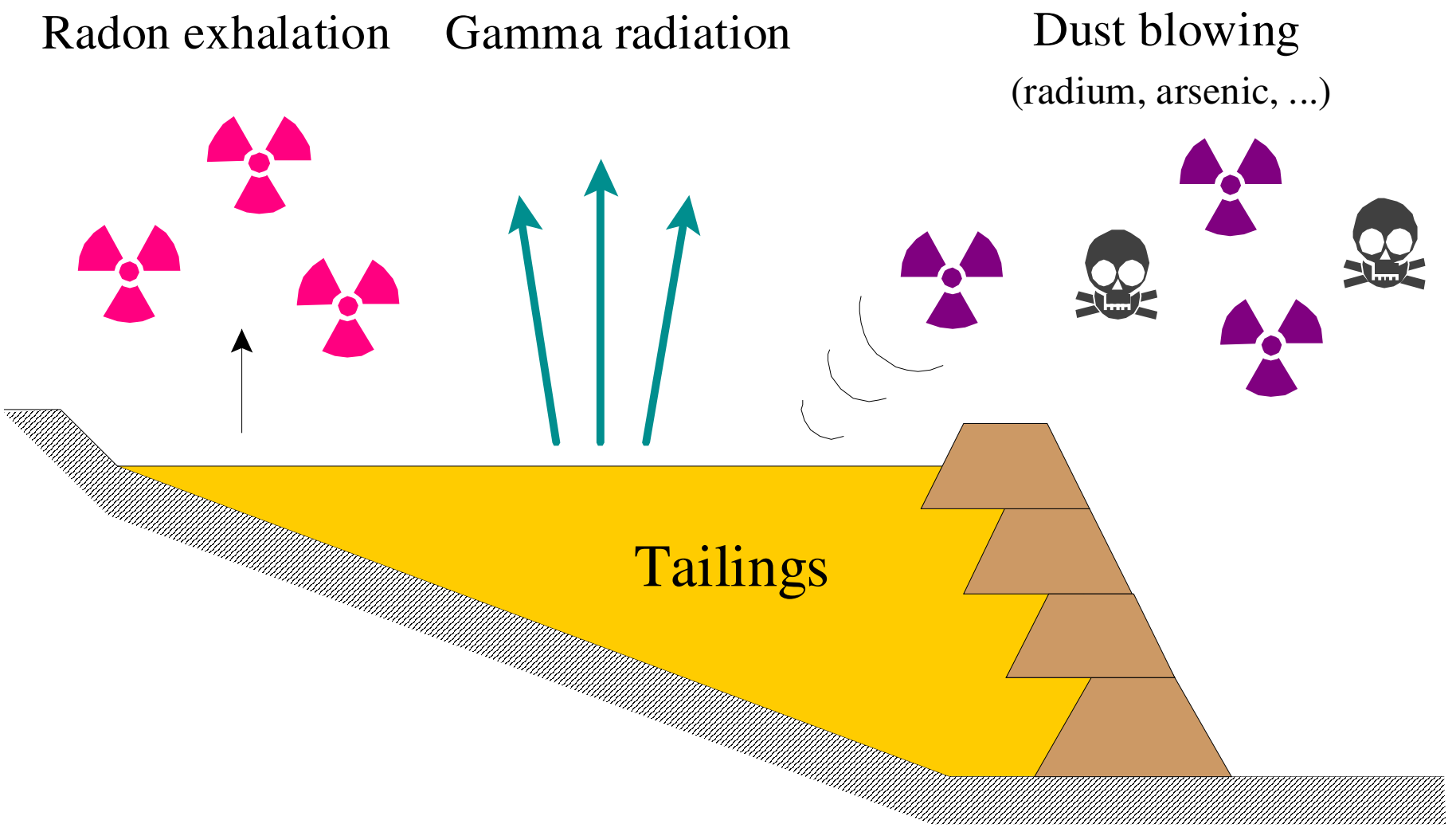
Uranium Mill Tailings Hazards



Uranium Mill Tailings Hazards

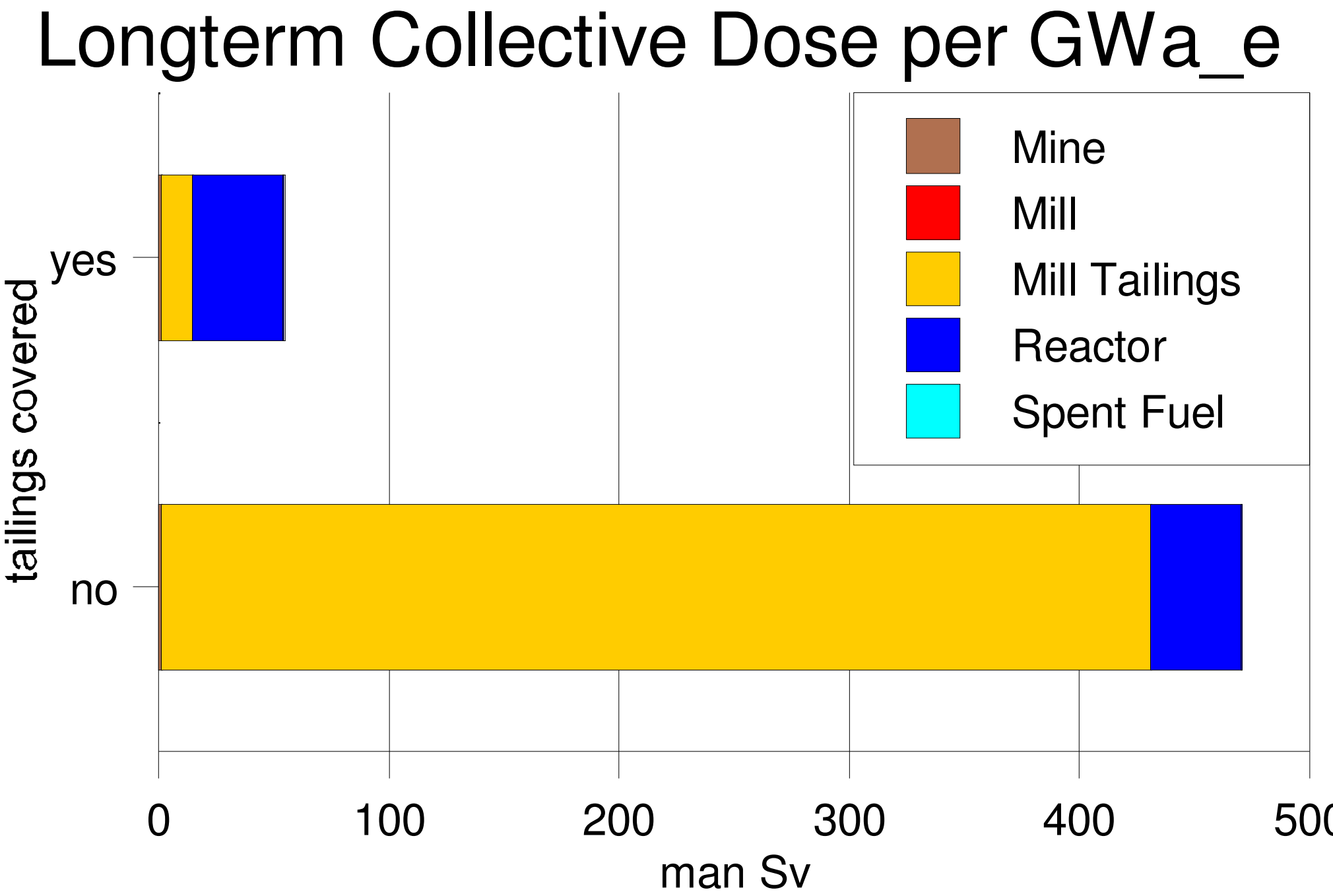


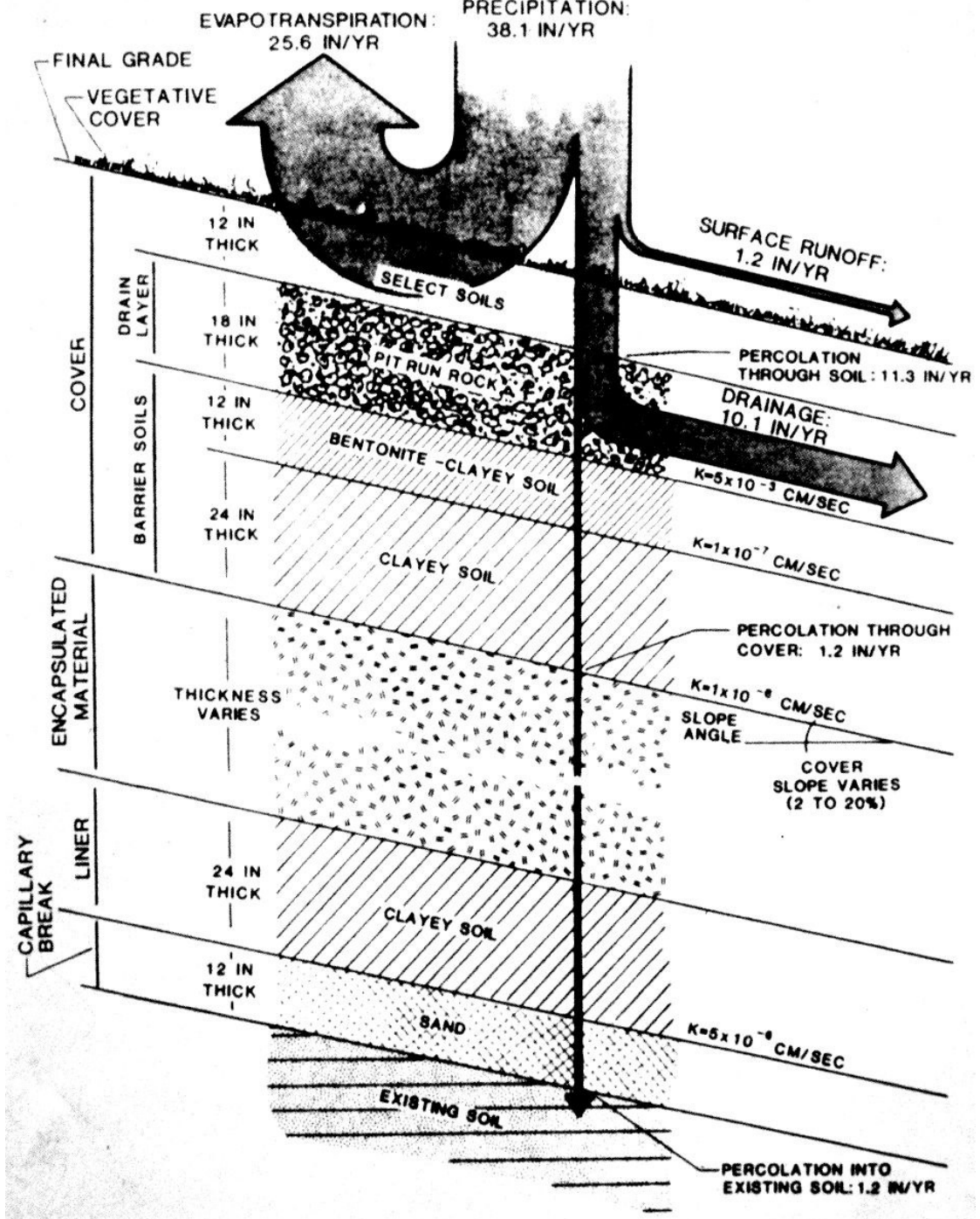
Uranium Mill Tailings Hazards



Moab, Utah, USA

Global long-term collective dose from electricity production of 1 GWa_e

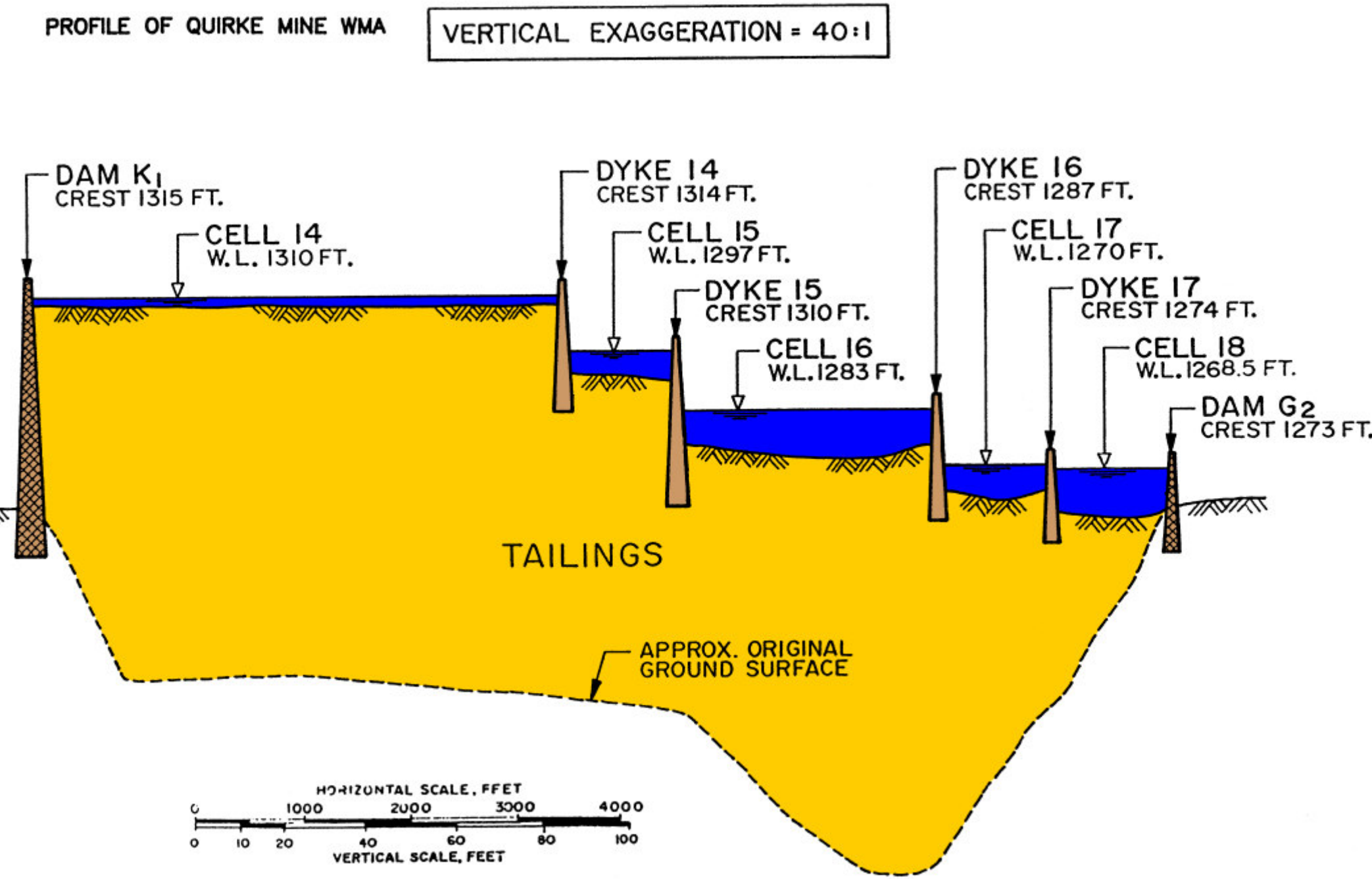




PROFILE OF ENCAPSULATION COVER AND LINER

Uranium Mill Tailings Site, Durango, Colorado, USA, 1979

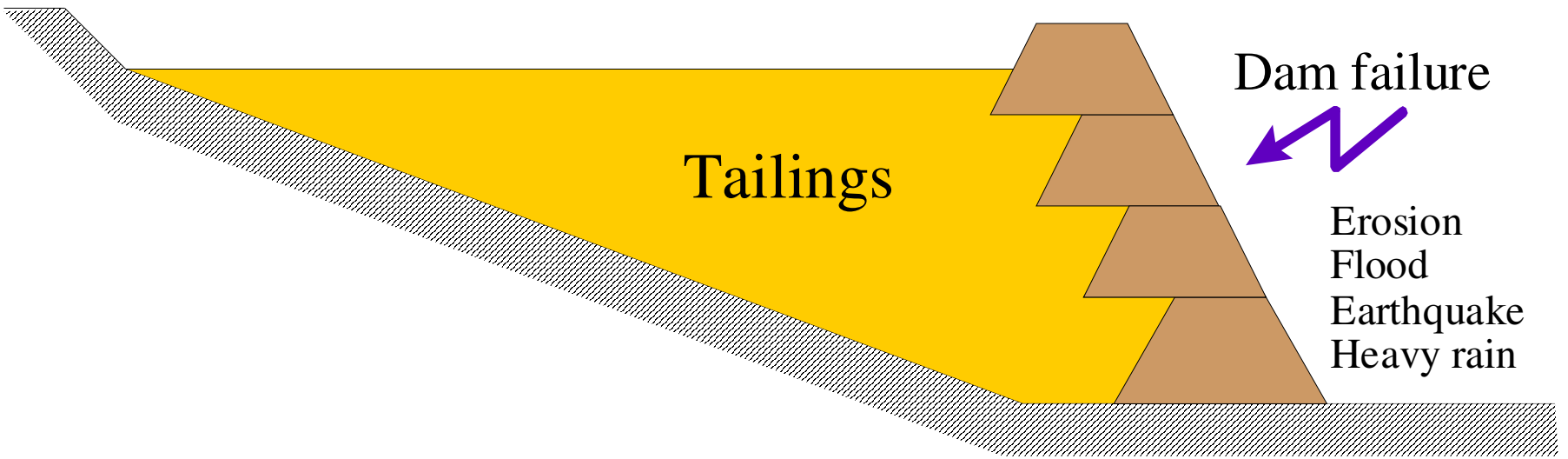
Bodo Canyon alternate disposal site, 12 km from Durango, Colorado, USA, 1992



Rio Algom Quirke Tailings, Elliot Lake, Ontario, Canada

Quirke Tailings, Elliot Lake, Ontario, Canada, 1999 (Rio Algom Ltd.)

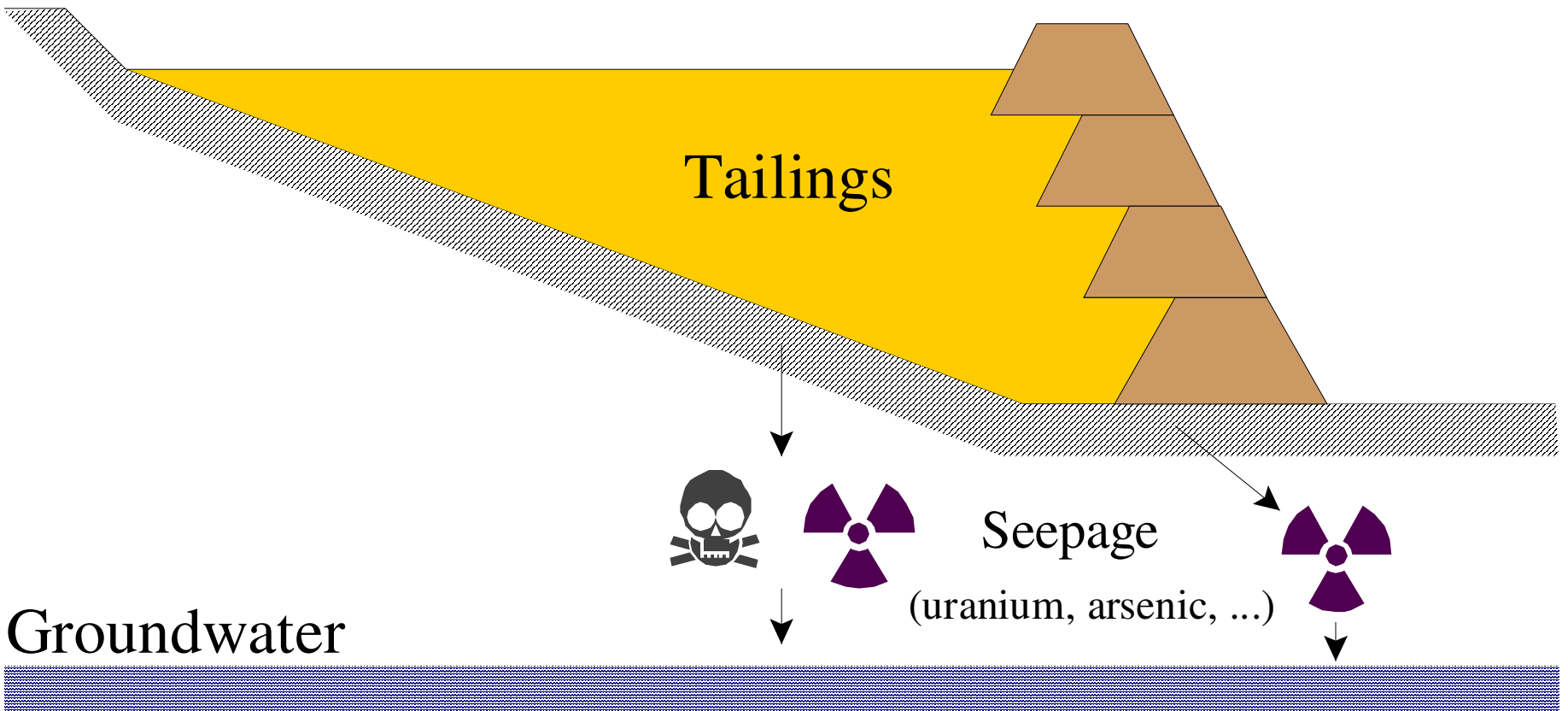
Uranium Mill Tailings Hazards



Groundwater

Mayluu-Suu tailing #7, Fergana Valley, Kyrgyzstan, April 1958

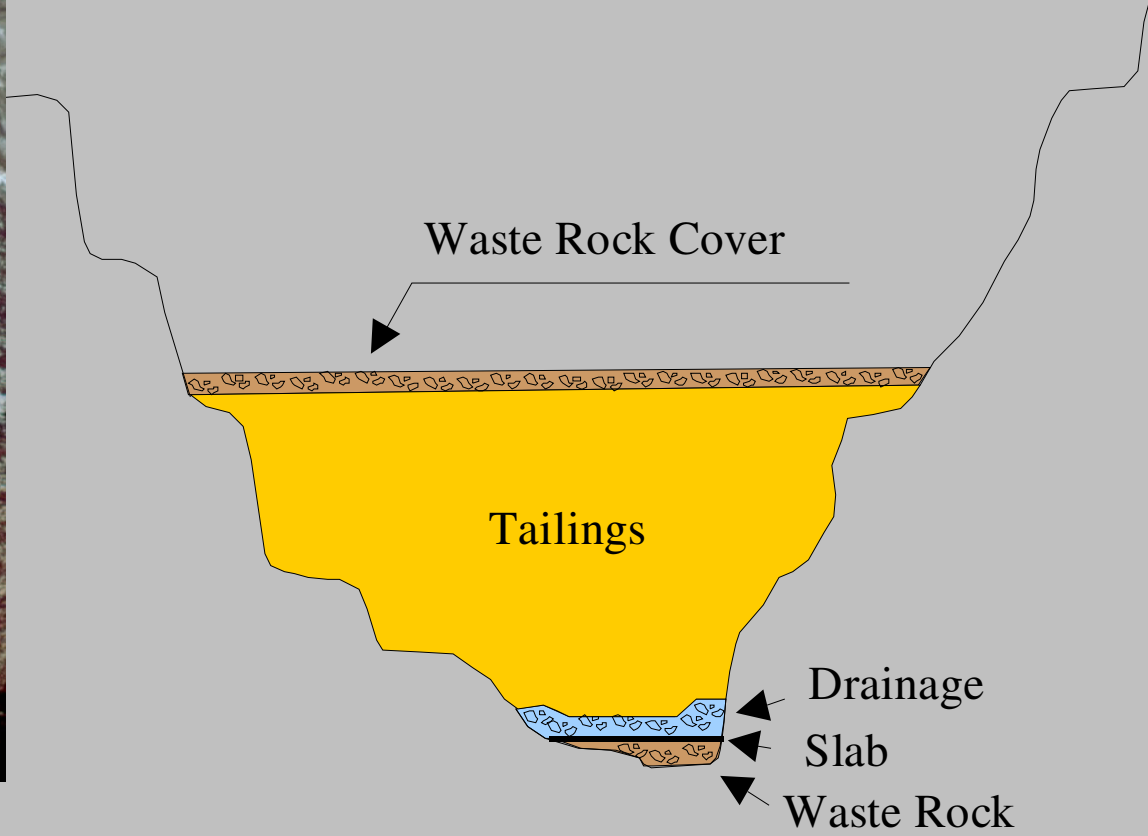
Uranium Mill Tailings Hazards

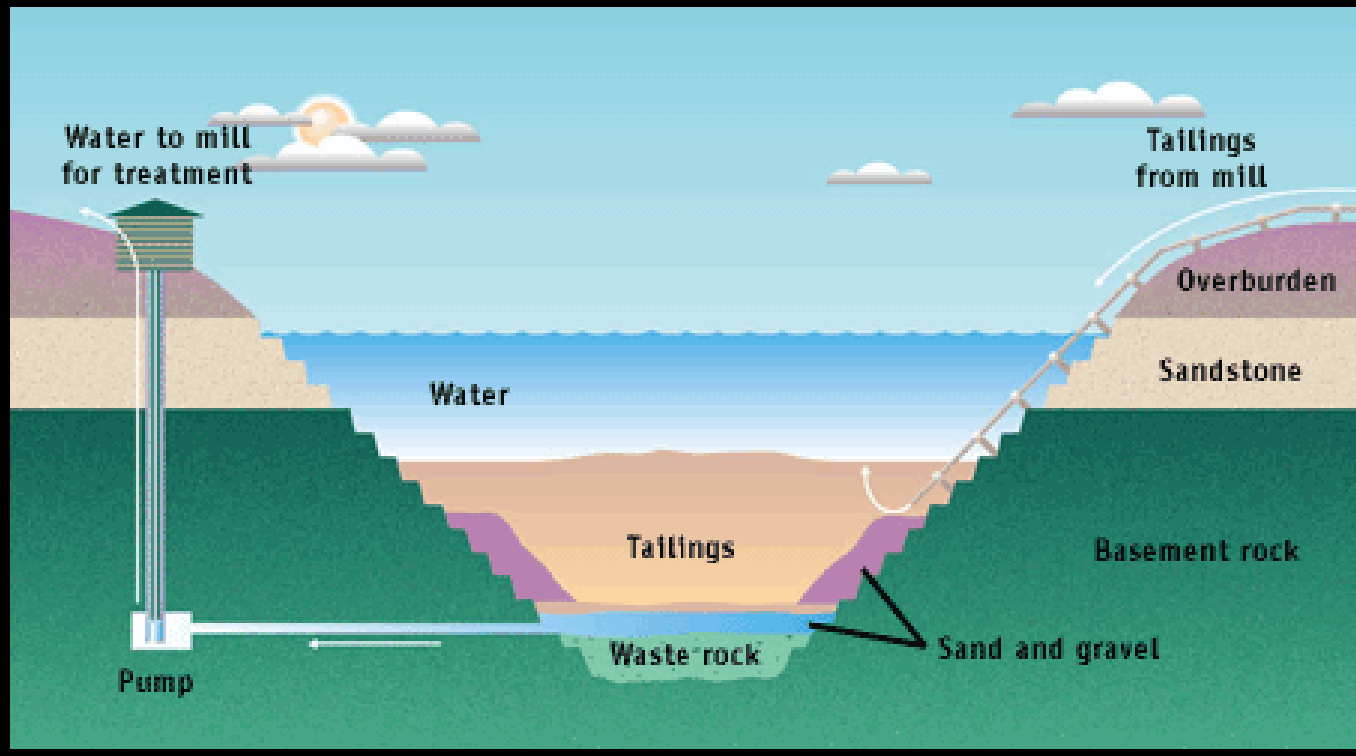


Atlas tailings, Moab, Utah, USA (U.S. DOE)

Tailings disposal in Bellezane open pit mine MCO 105 (Haute Vienne, France)

1992

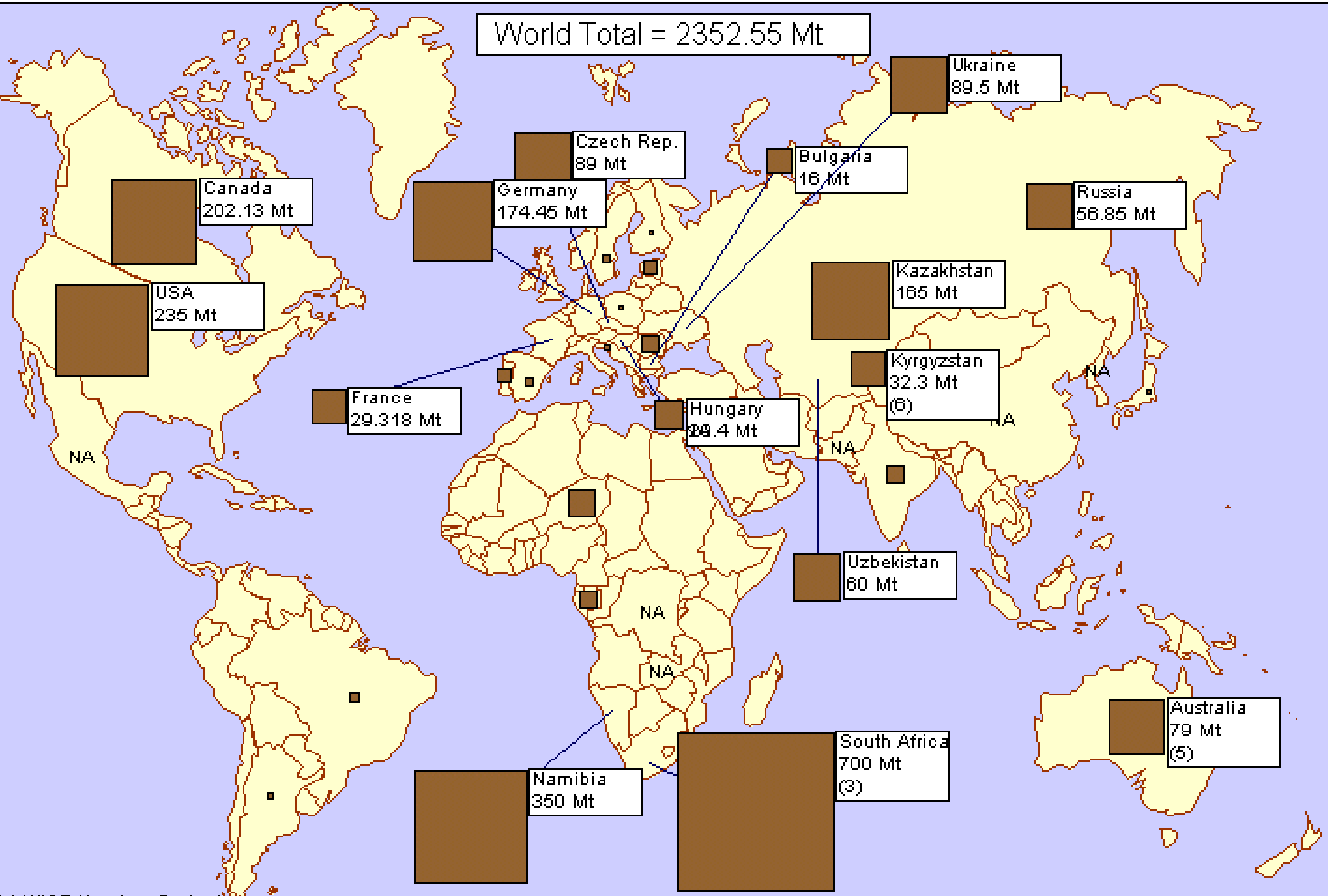




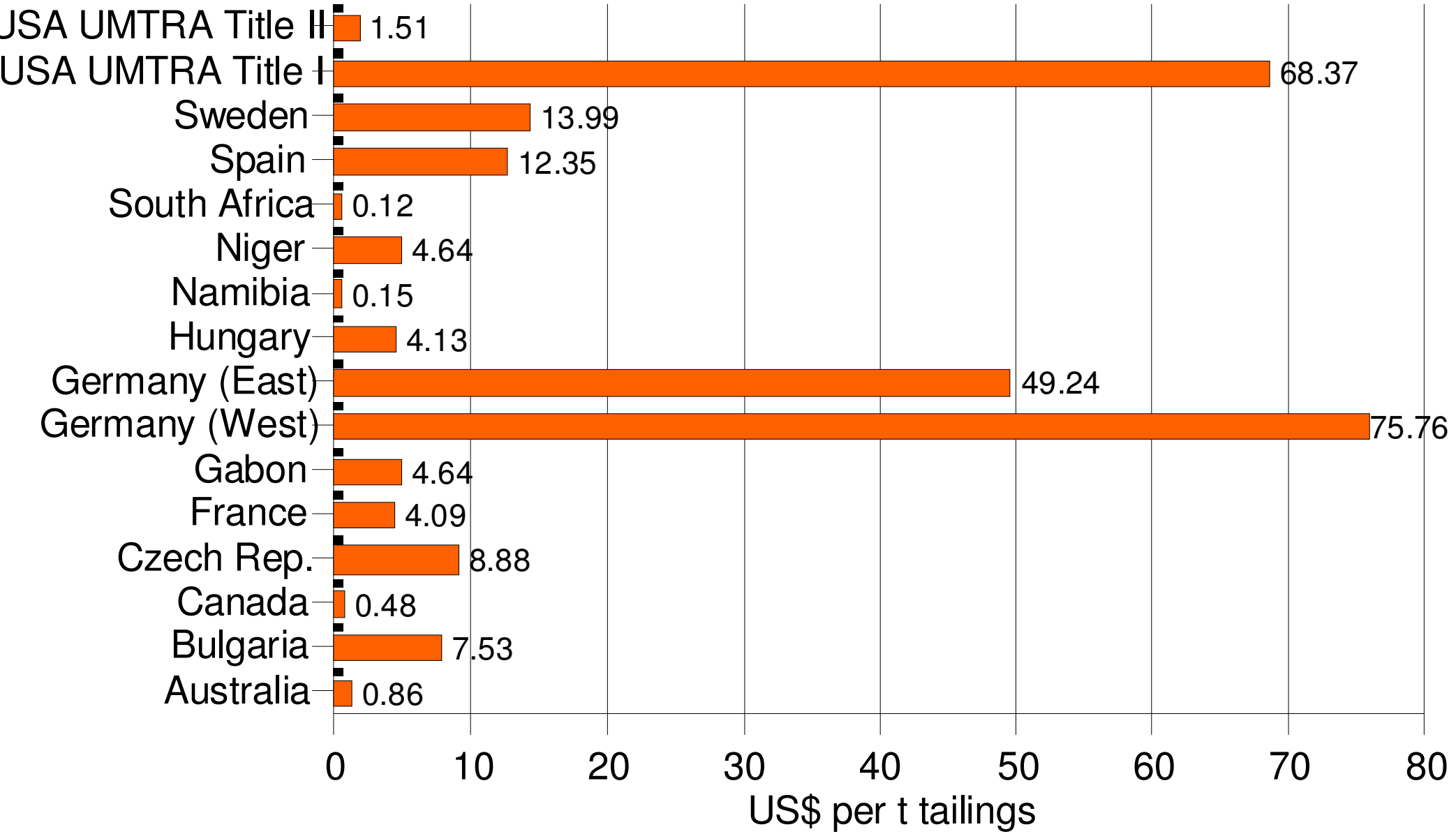
Tailings disposal in Deilmann open pit, Key Lake, Saskatchewan, Canada (Cameco)

Uranium Mill Tailings Inventory

[million t] Total

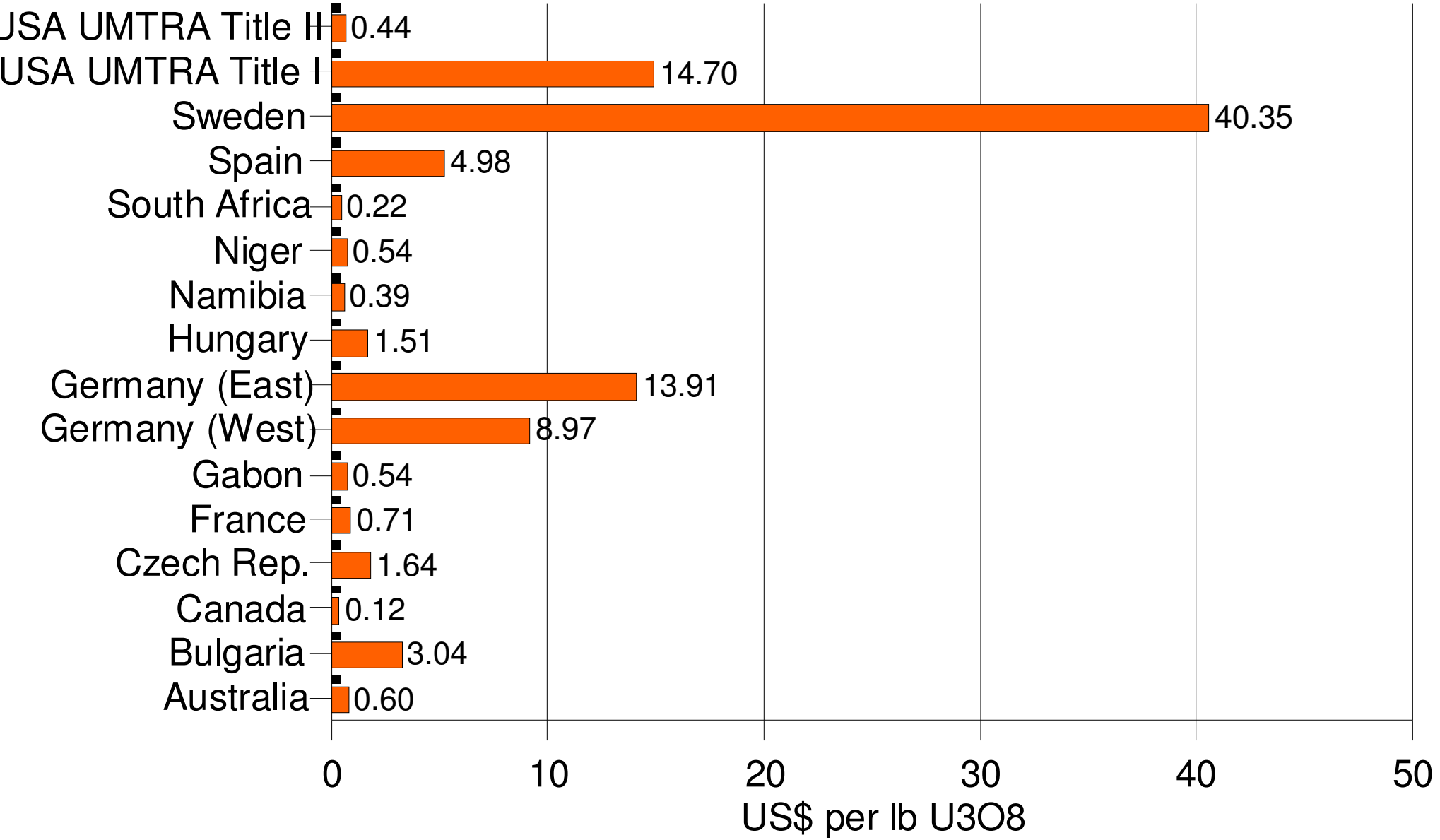


Reclamation Cost per t tailings



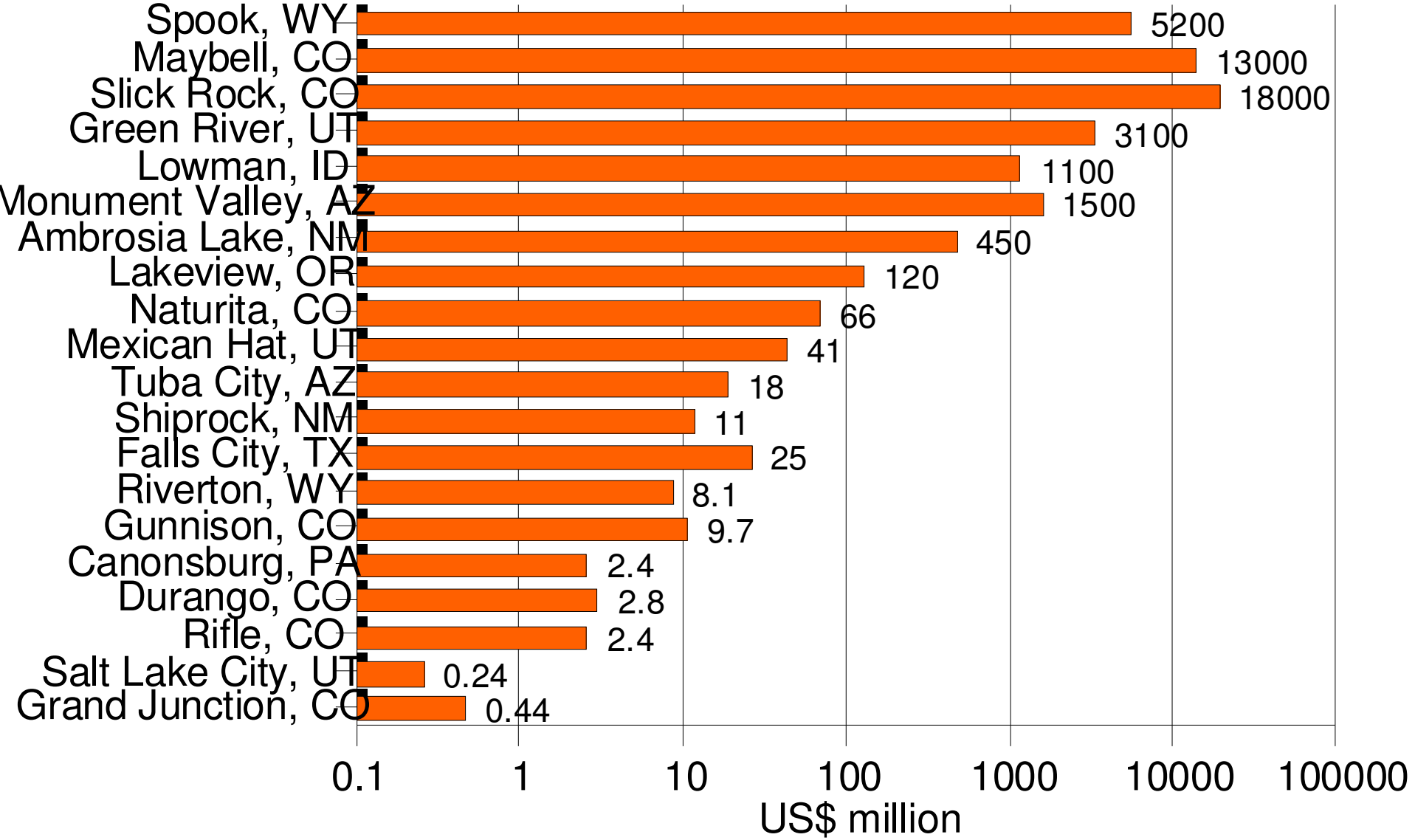
(after: BMWi 1995)

Reclamation Cost per lb U3O8 produced



(after: BMWi 1995)

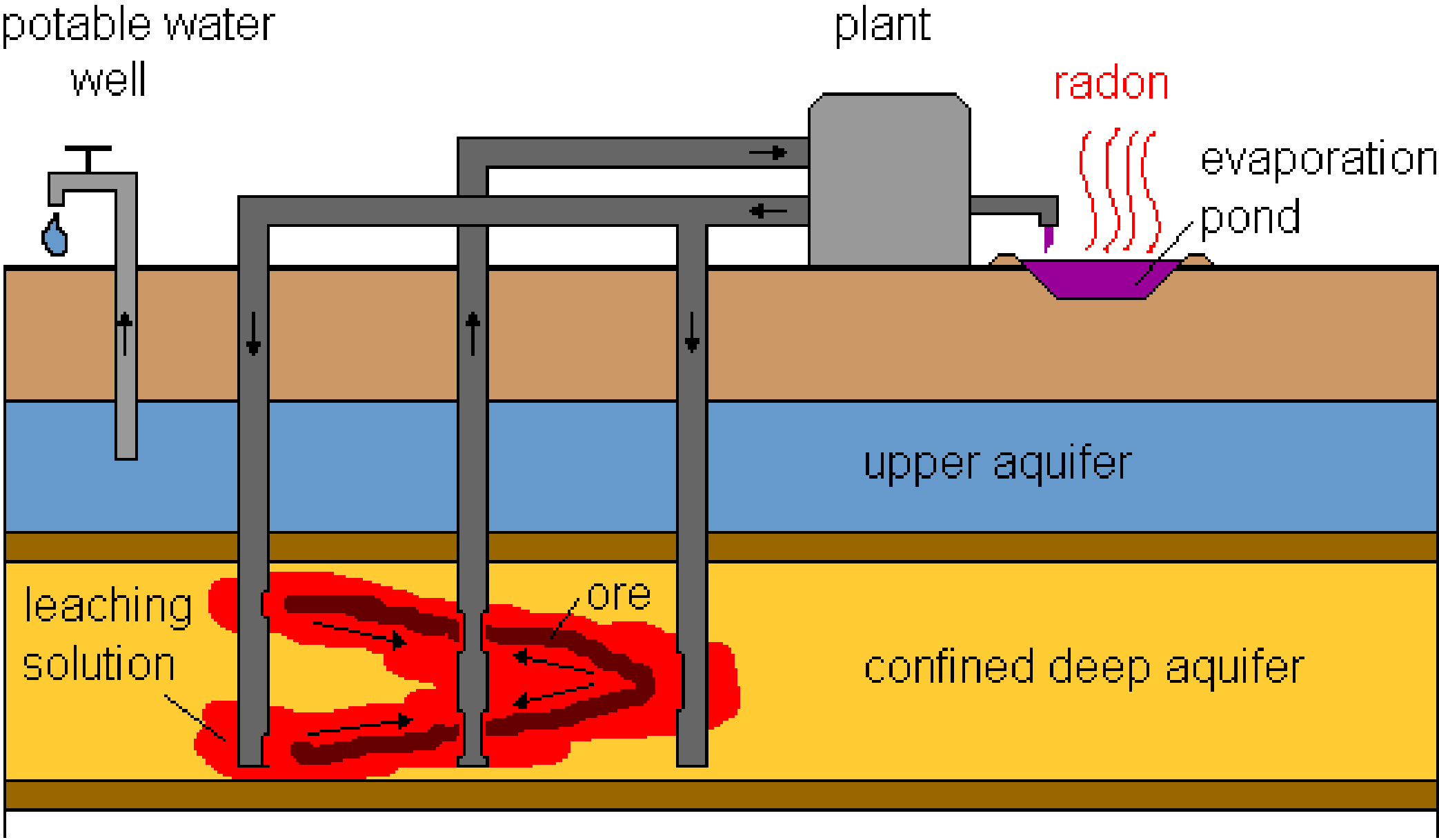
Cost per death prevented in 100 years



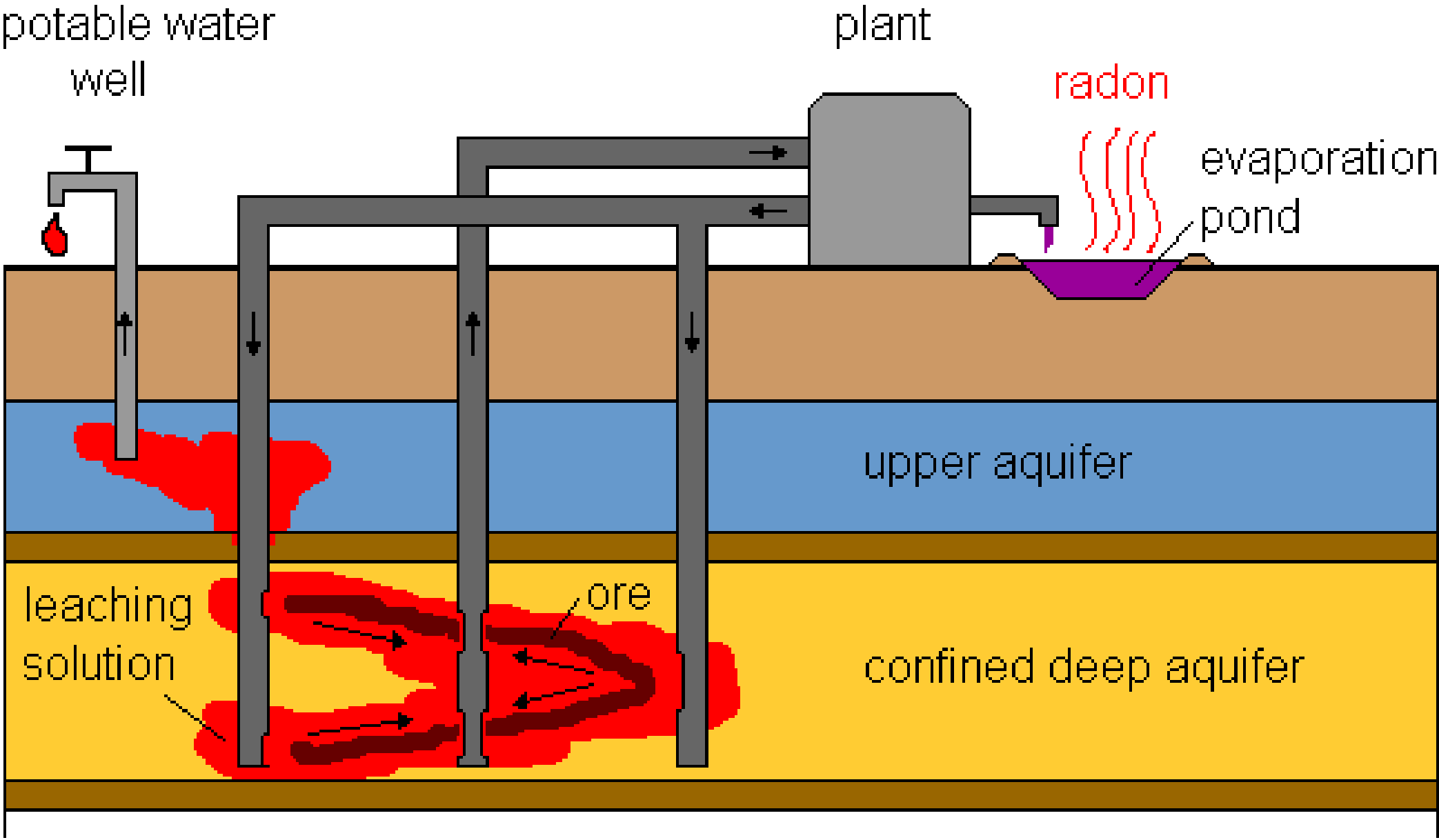
(after: Miller et al. 1999)

Stráž pod Ralskem, Czech Republic, June 1995

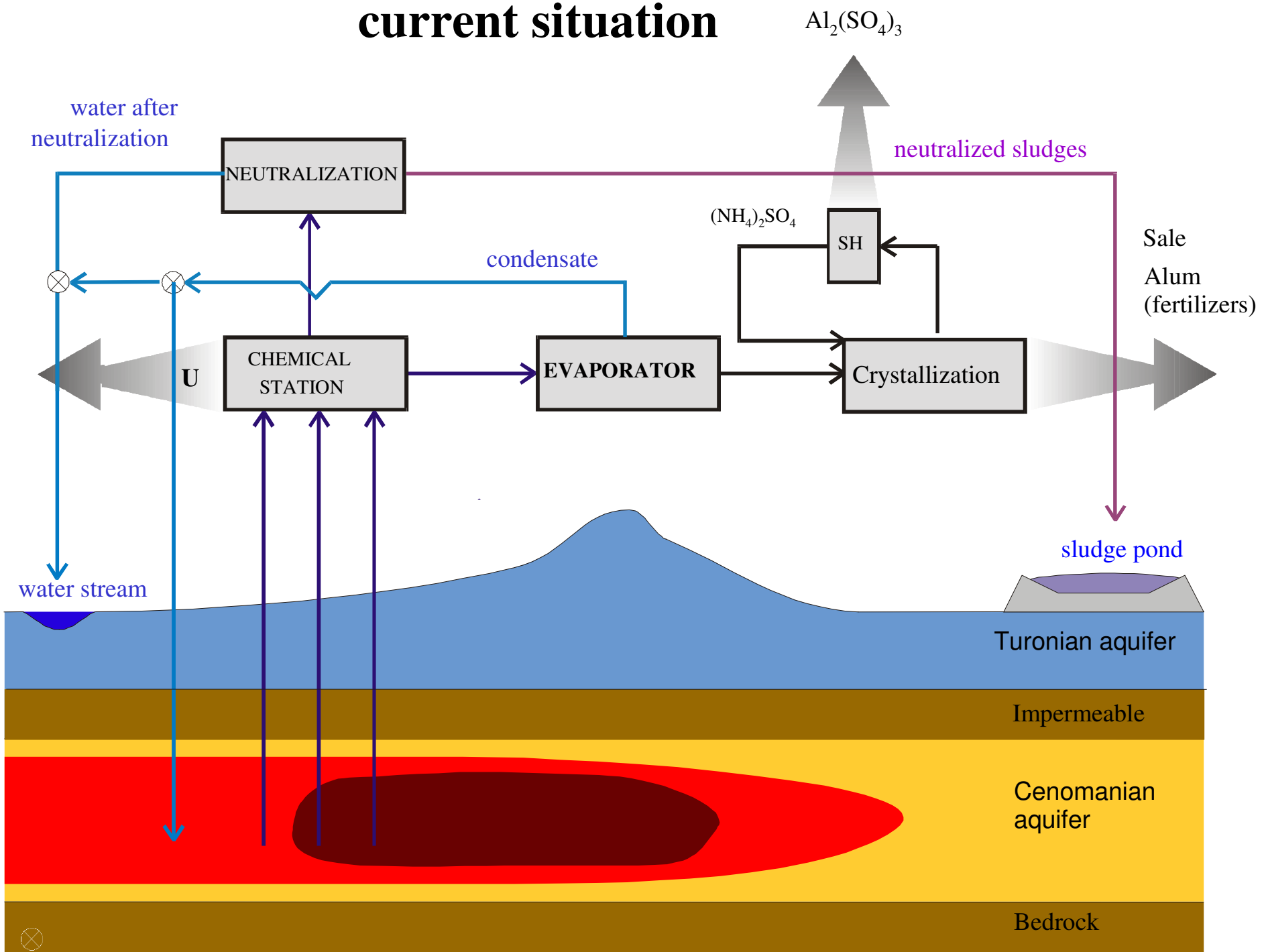
In-Situ Leaching



In-Situ Leaching

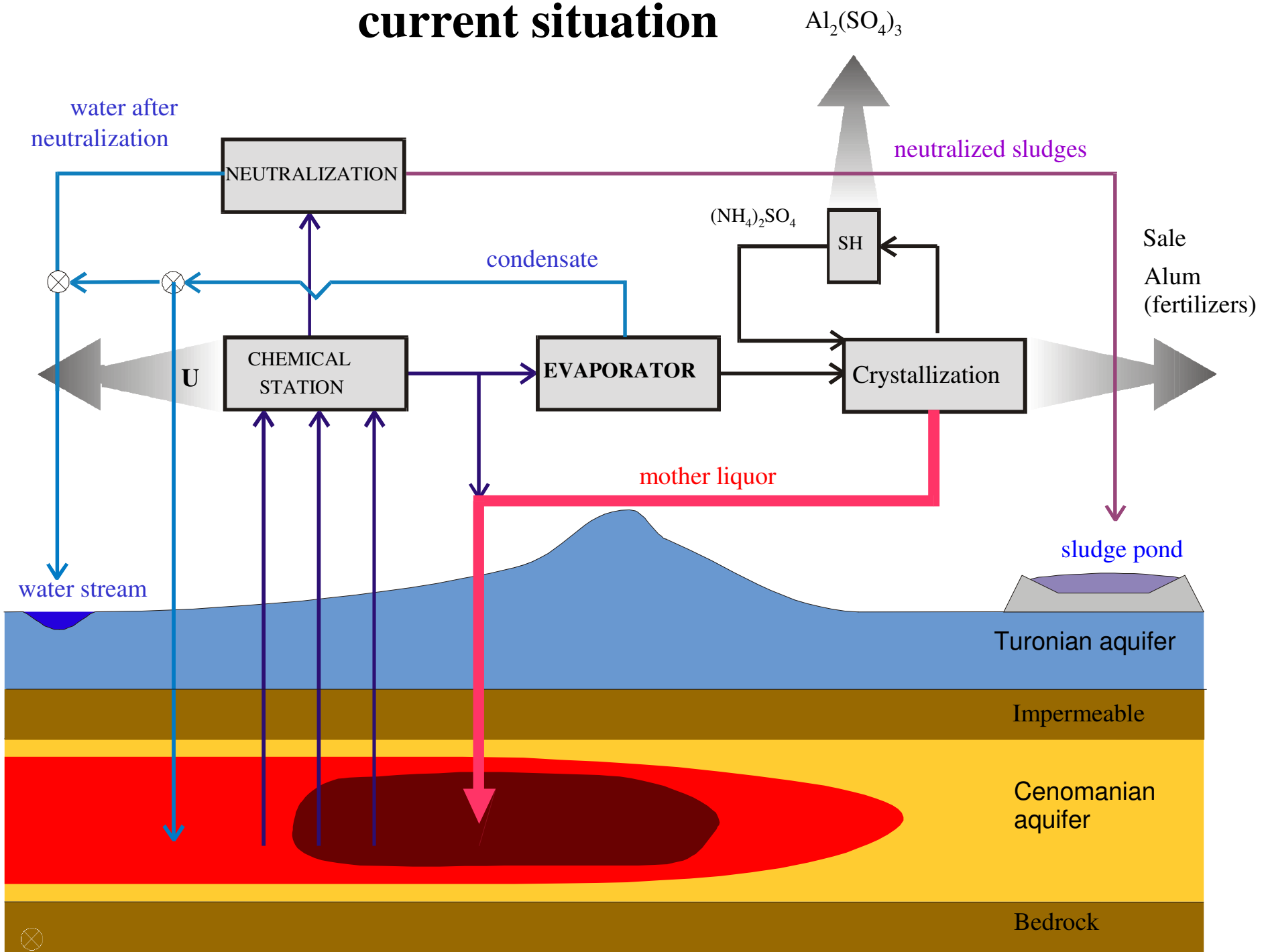


Flow diagram of clean-up technology – Stráž ISL current situation



(after: Diamo 2004)

Flow diagram of clean-up technology – Stráž ISL current situation



(after: Diamo 2004)

Tzarimir, Bulgaria, 1995

http://www.wise-uranium.org