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Deposition Rates of U and Th by NAA of witness plates: An Update

P. Jagam and J.J. Simpson

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The table presents the results of the uranium and thorium deposition rates measured at various locations in the SNO cavity by neutron activation analysis of saran-wrap witness plates. An unexposed piece of saran wrap was also activated. It was found to contain about 2.7 ± 0.6 ng/m² Th and < 0.8 ng/m² U. Since the AV centre witness plate was only exposed for two weeks, the saran wrap blank amounts to a reduction of 15% to the value and this has been incorporated in the result. The other results have not been corrected for the blank. The table also gives the average dust deposition rates, assuming that the Th and U comes from mine dust of 3.3 ppm Th and 1.2 ppm U (White Book).

The deposition rate on the PSUP suggests that the top half of the PSUP would collect (assuming 500 m² area) between 200 and 300 g of mine dust in one year. If all this dissolved in the outer 6000 tonnes of water the water would contain $\sim 1.2 \times 10^{13}$ g/g of thorium.

Using the dust deposition rate at the AV centre, during an assembly period of five months the inside lower half of the AV vessel would collect about 12 g of dust or 35 μ g of Th. Cleaning must remove 97% of this to reduce the amount of thorium to 1 μ g which is the amount in the D₂O at 10^{-15} g/g.

Based on the one blank measurement we have made, the maximum sensitivity for the present technique is about 3 ng/mo-m² for Th or 1 mg/mo-m² of mine dust if one exposes the witness plates for only one month.

Table: Deposition Rates of Uranium and Thorium

Location	Date	U $\left(\frac{\text{ng}}{\text{mo-m}^2}\right)$	Th $\left(\frac{\text{ng}}{\text{mo-m}^2}\right)$	Approximate Dust Deposition Rate mg/mo-m ²
Top PSUP	July-Aug 1995	57 ± 11	170 ± 30	50 ± 7
	Sept. 1995	44 ± 7	110 ± 11	35 ± 3
Deck	July-Aug 1995	25 ± 7	34 ± 12	15 ± 5
	Sept. 1995	24 ± 6	45 ± 4	17 ± 3
Control Room	July-Aug 1995	25 ± 7	101 ± 18	26 ± 4
	Sept. 1995	47 ± 8	48 ± 9	27 ± 12
Acrylic Vessel Centre	Sept. 1995	9 ± 9	31 ± 8	9 ± 2
Guelph Lab	July-Aug 1995	44 ± 17	45 ± 10	