



National Physical Laboratory

LB samples

NPL Environmental Radioactivity Comparison
Workshop

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Radionuclides in LB

3 nuclides 100-500 Bq kg⁻¹

500 g Sample



³H 491.5 (5) Bq kg⁻¹

¹⁴C 160.4 (10) Bq kg⁻¹

³⁵S 411.1 (10) Bq kg⁻¹

Treatment of data

- (i) Deviation D from NPL value (%)

$$D = 100 \frac{L - N}{N} = 100 \left(\frac{L}{N} - 1 \right)$$

- (ii) u-test ($P = 0.01$) and relative uncertainty ratio R_R

$$u = \frac{|L - N|}{\sqrt{u_L^2 + u_N^2}} \quad R_R = \frac{N u_L}{L u_N}$$

$u < 2.58$

$u < 2.58$ but R_R is an outlier

$u > 2.58$

‘in agreement’

‘possibly in agreement’

‘discrepant’

H-3 results

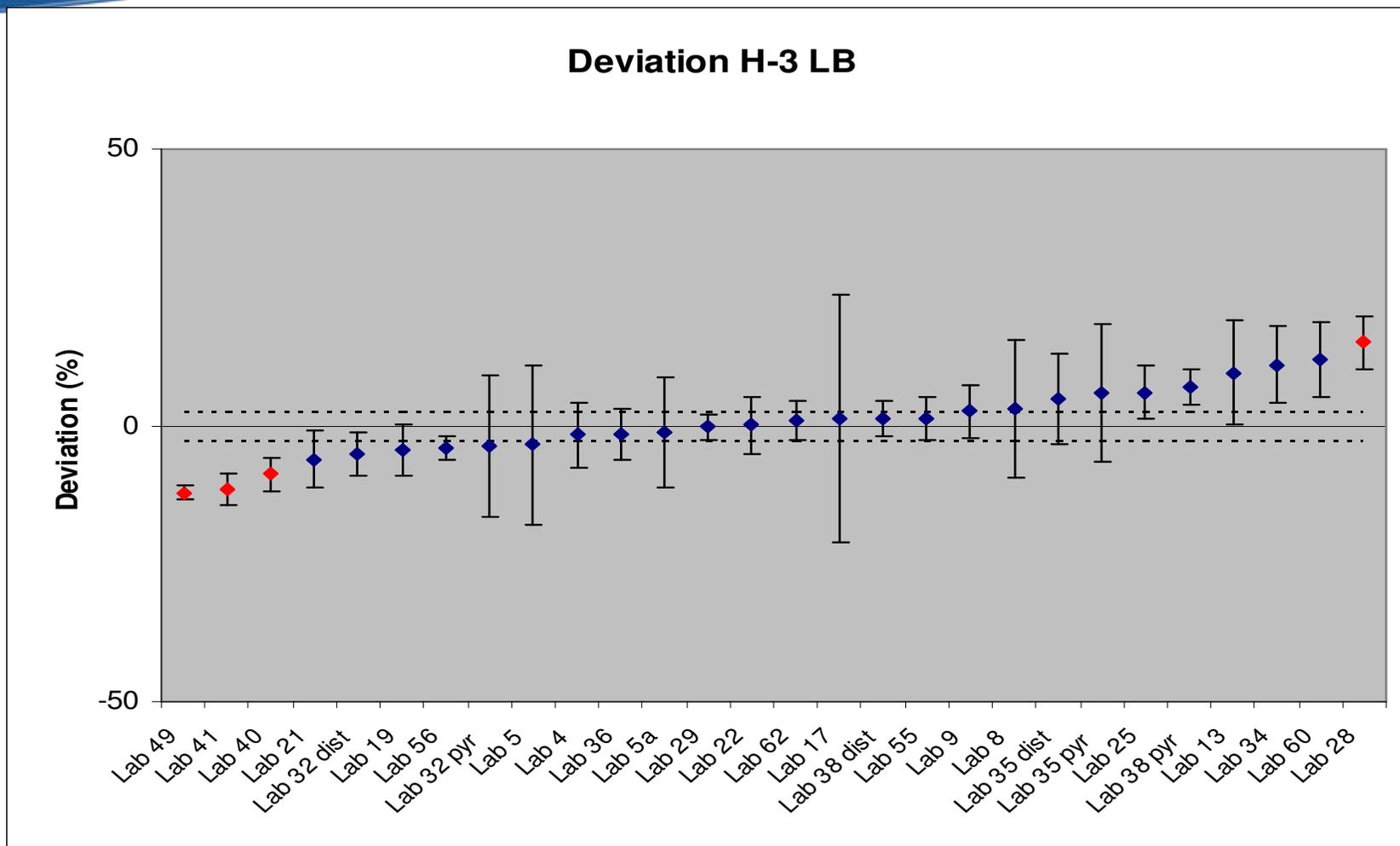
LB

28 results

86% of the results 'in agreement'

Deviation mean: $(0.6 \pm 3.5) \%$

Deviation median: 0.5%



C-14 results

LB

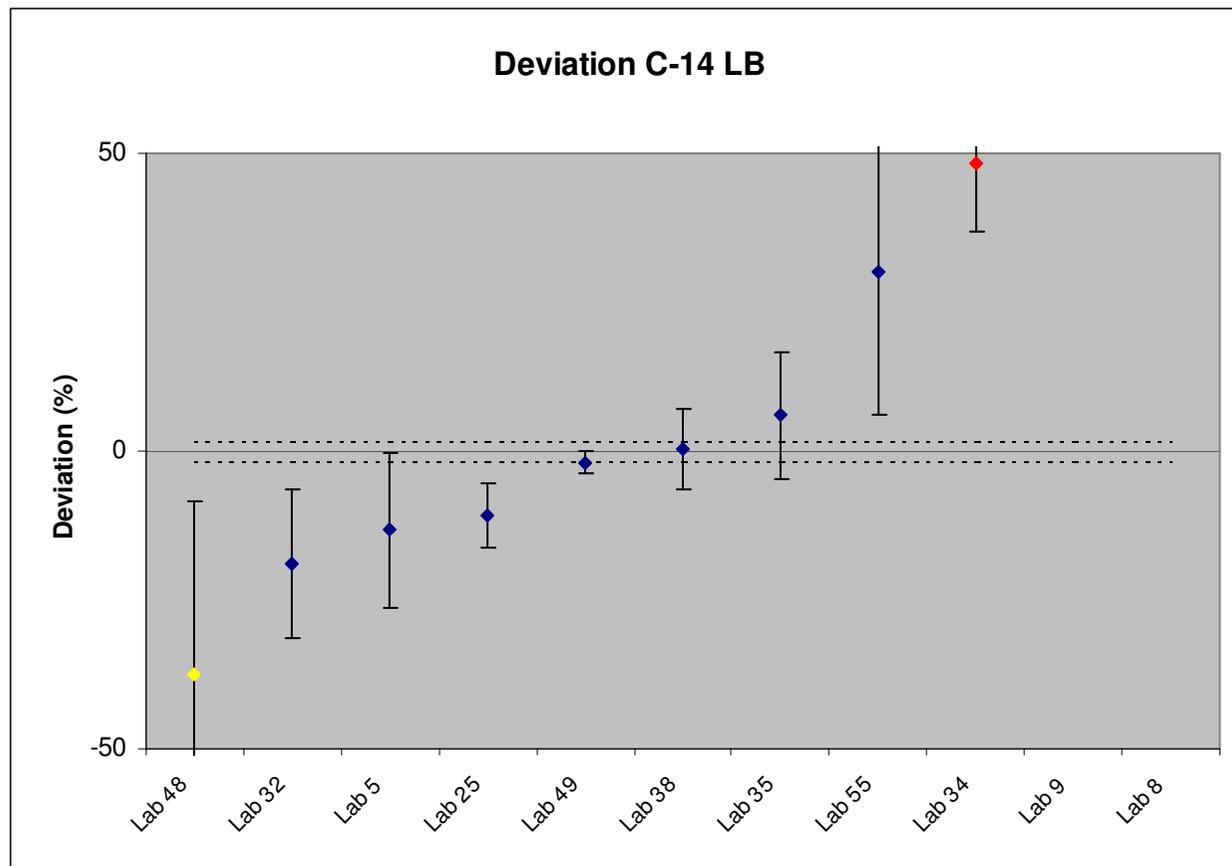
11 results

64% of the results 'in agreement'

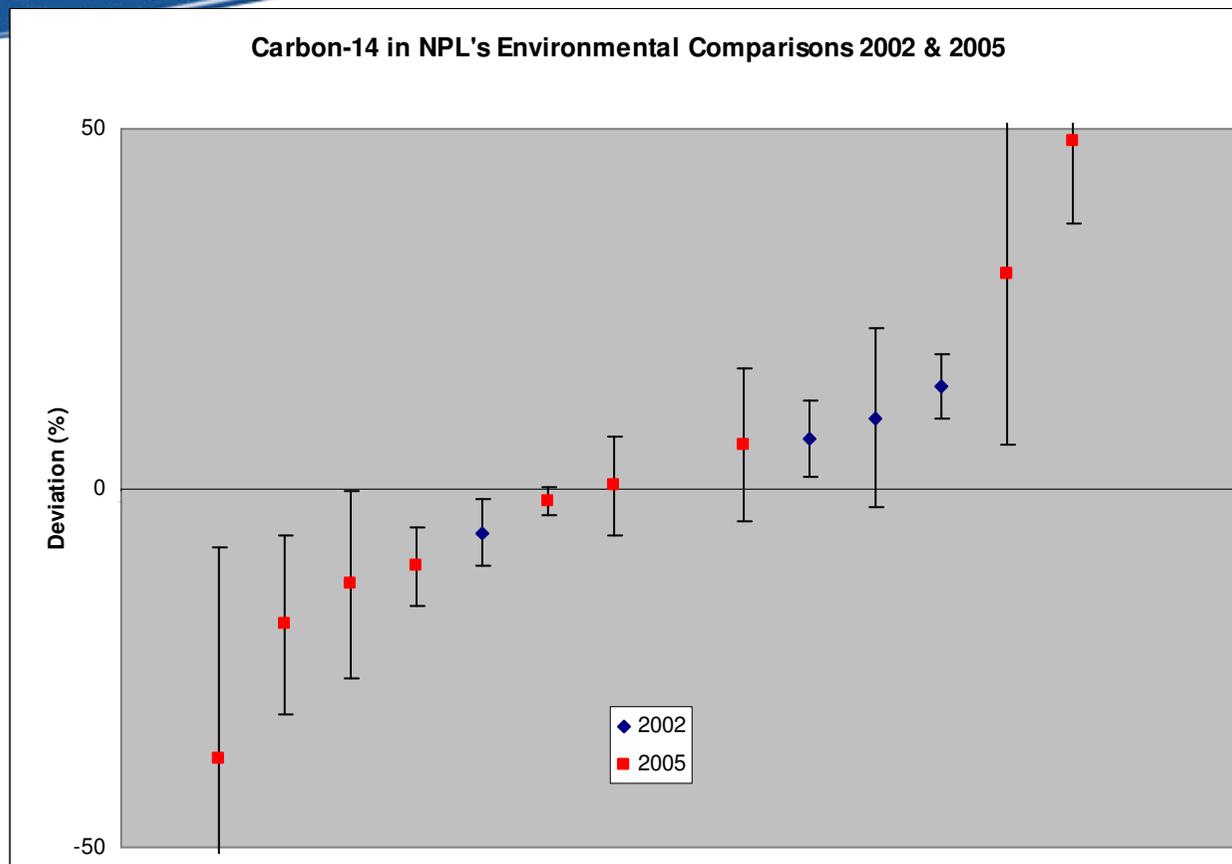
Deviation mean: $(21 \pm 50) \%$

Deviation median: 0.4%

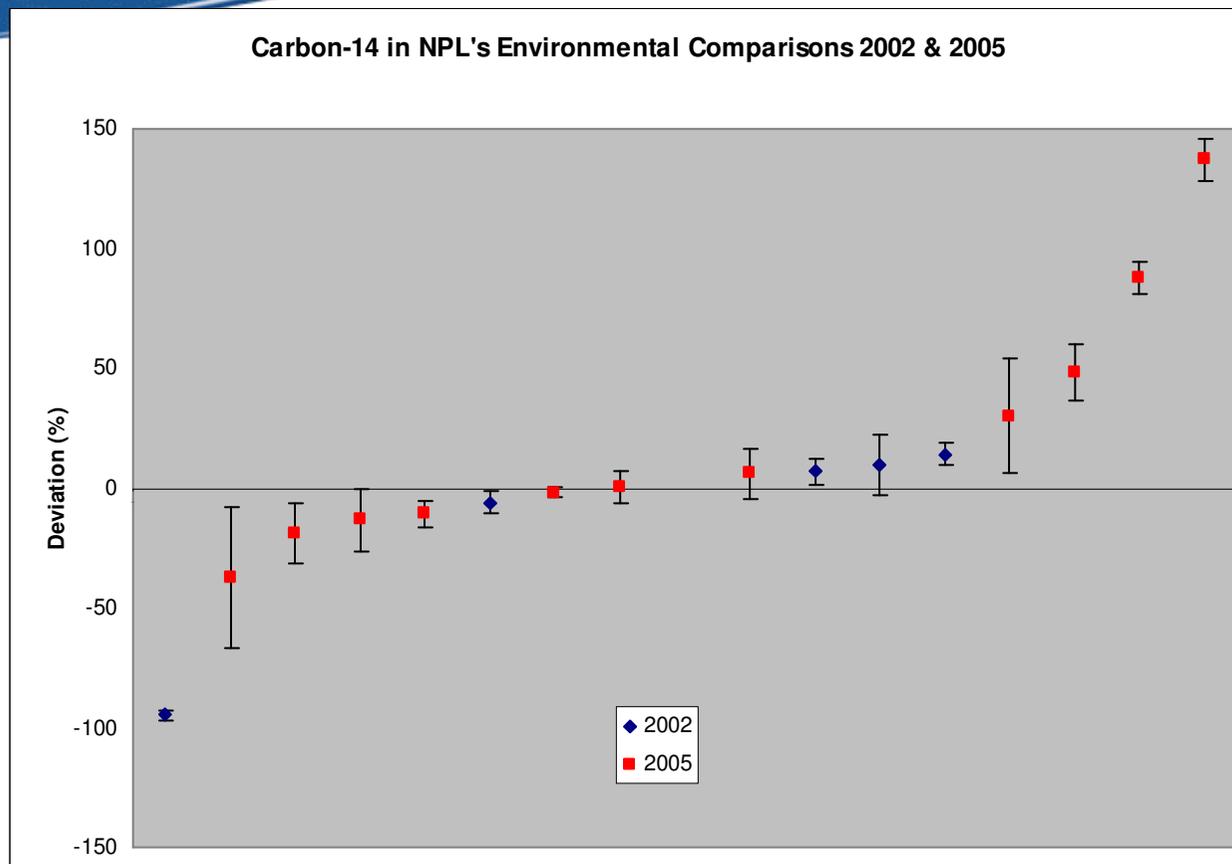
C-14 LB



C-14 LB



C-14 LB



S-35 results

LB

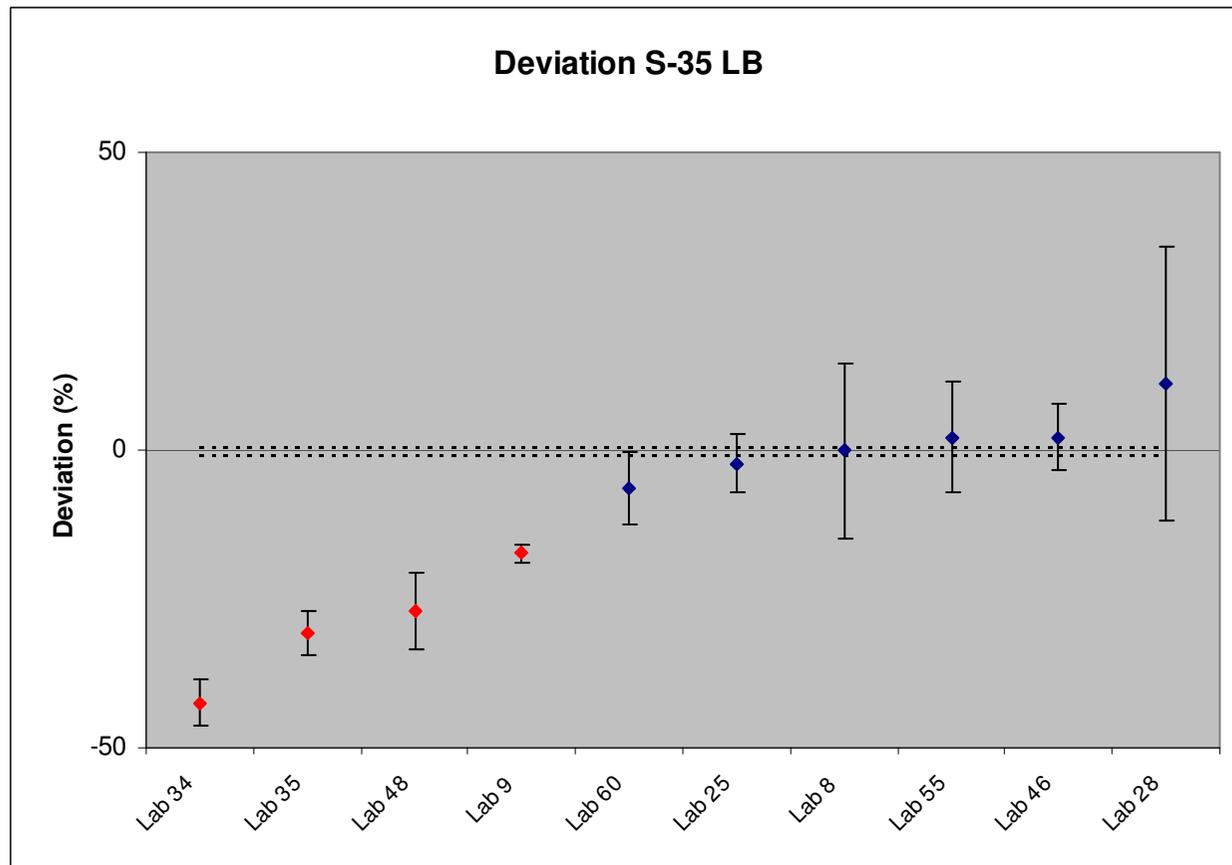
10 results

60% of the results 'in agreement'

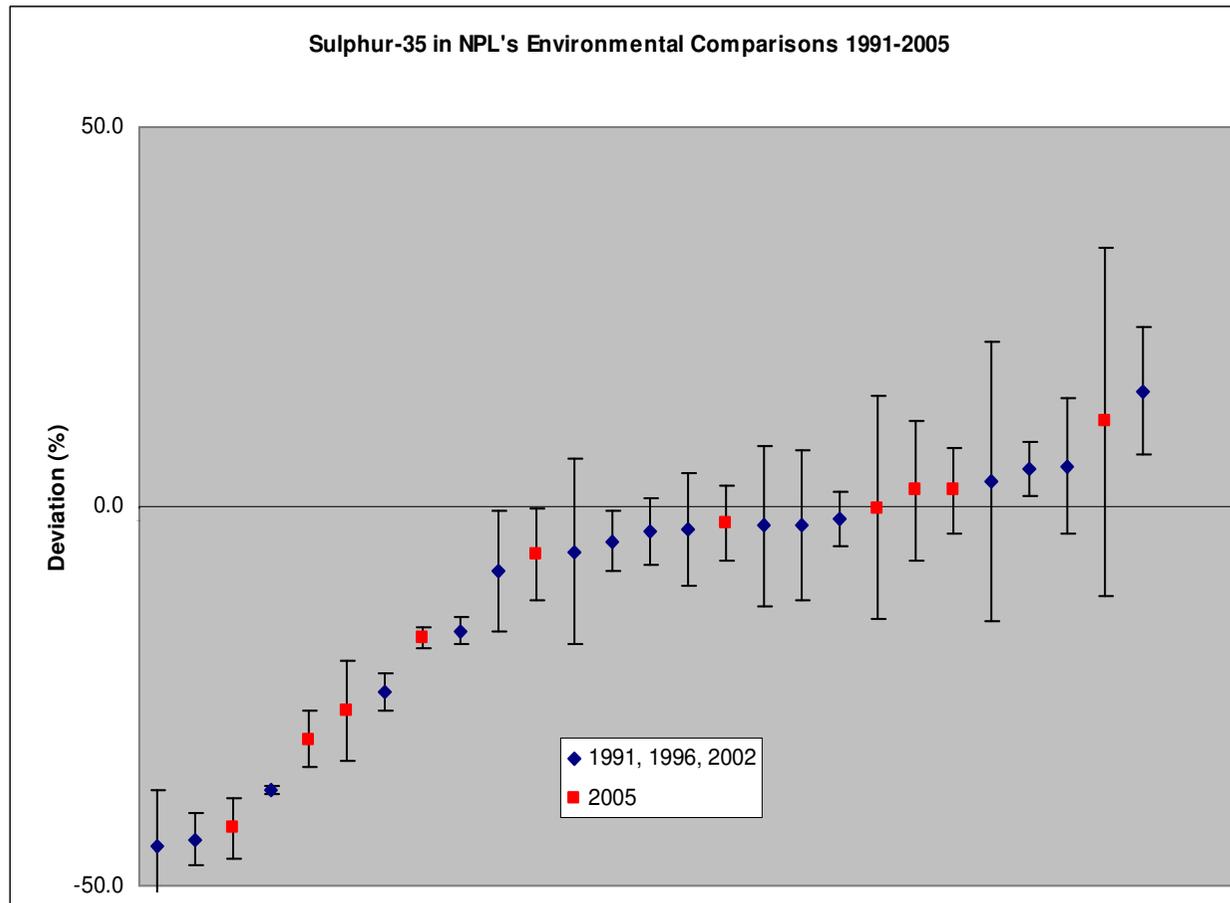
Deviation mean: $(-11 \pm 18) \%$

Deviation median: -4%

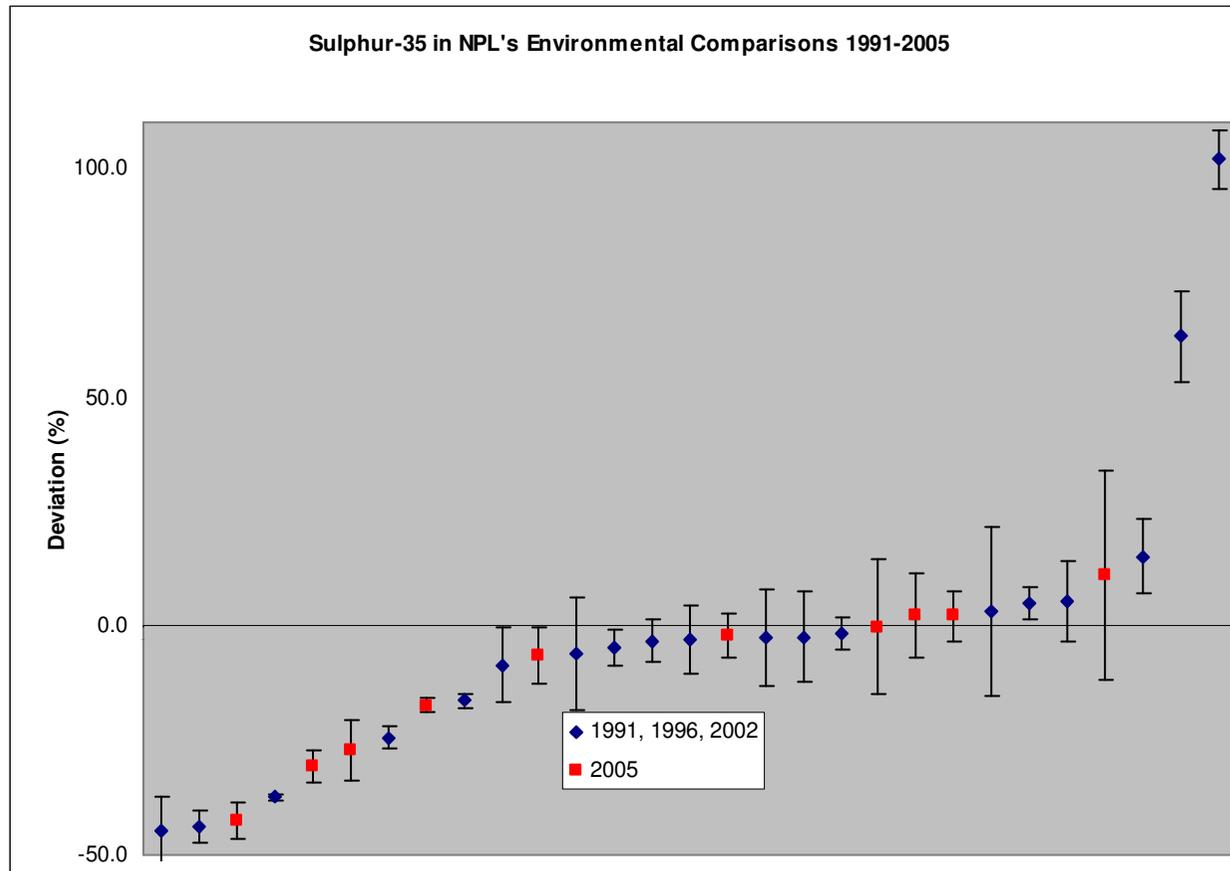
S-35 LB



S-35 LB



S-35 LB



LB summary

Results

76%

'in agreement'

2%

'probably in agreement'

22%

'discrepant'

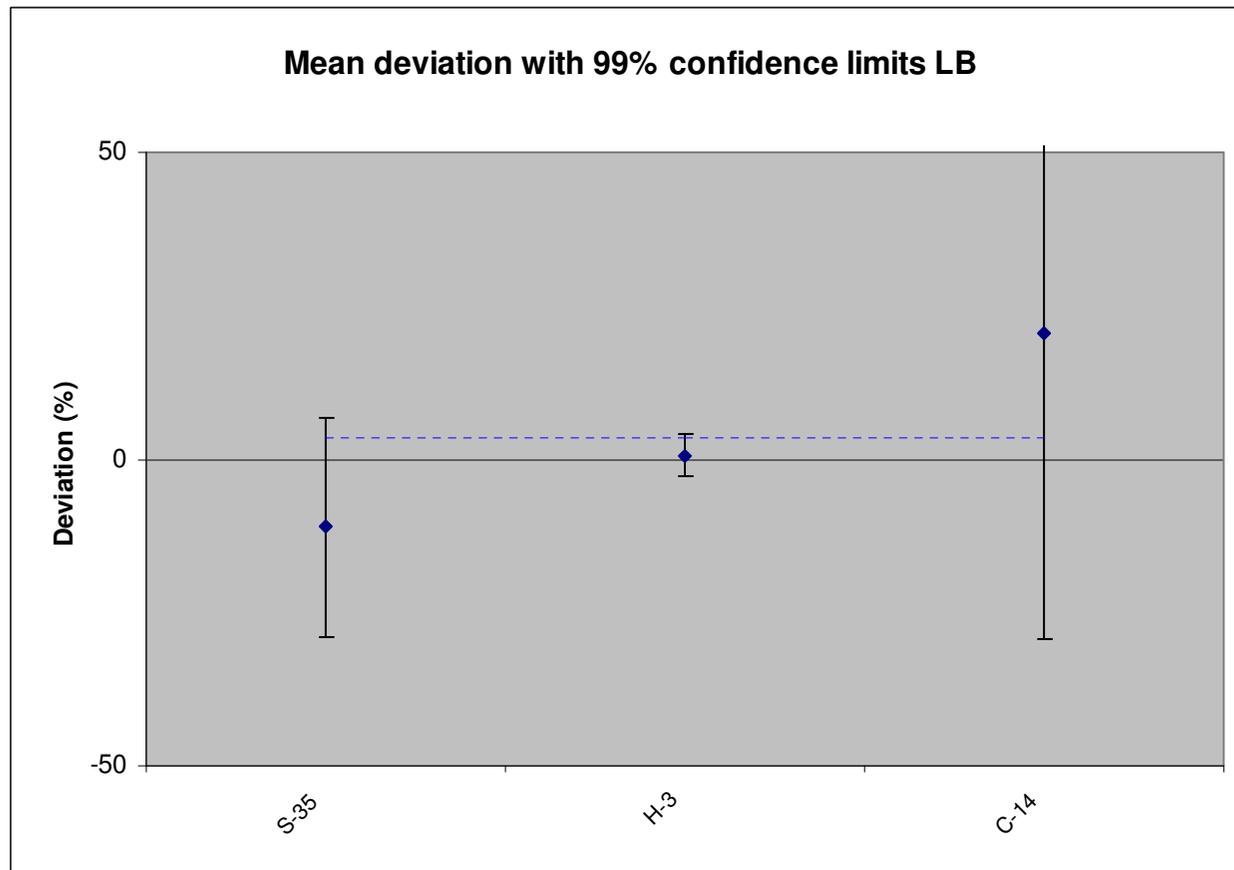
Problematic nuclides:

^{14}C and ^{35}S

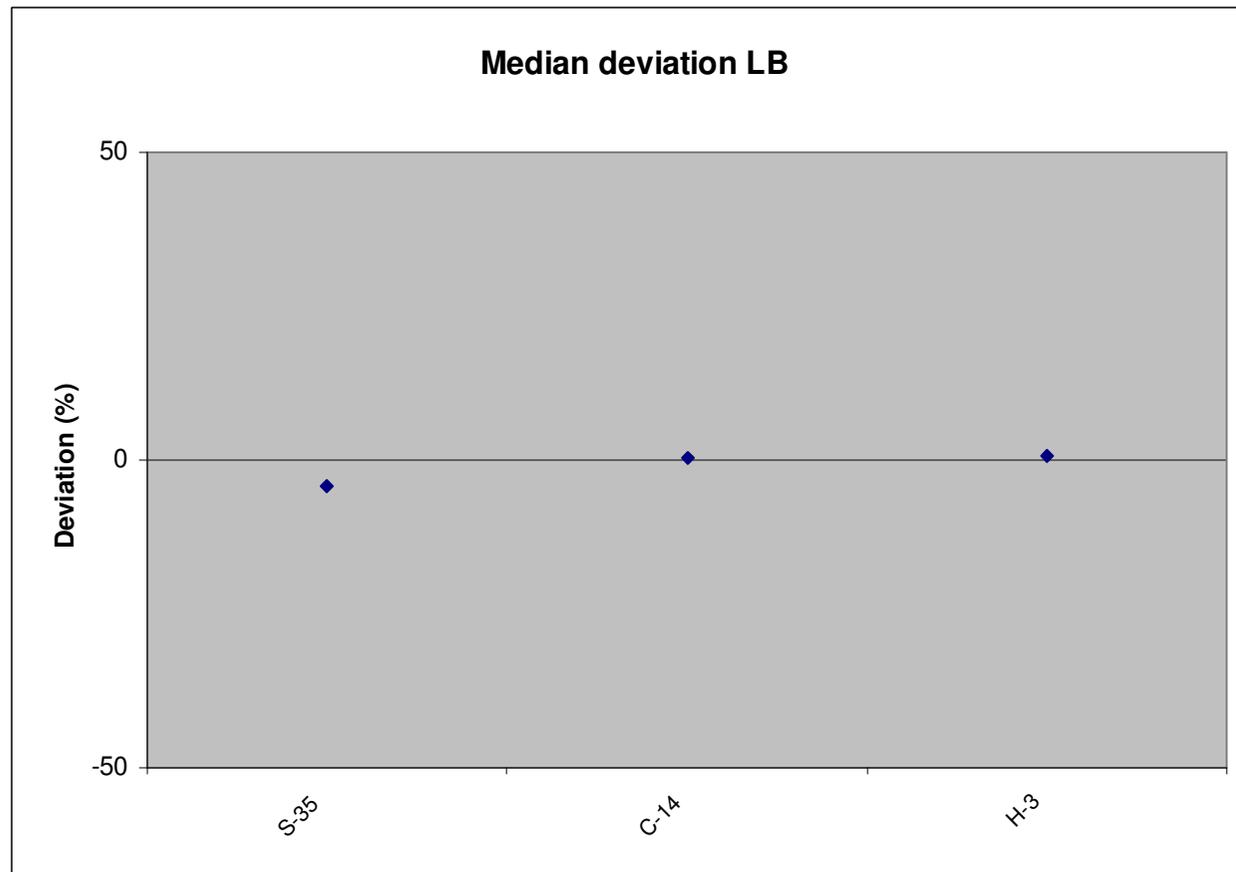
Less problematic:

^3H

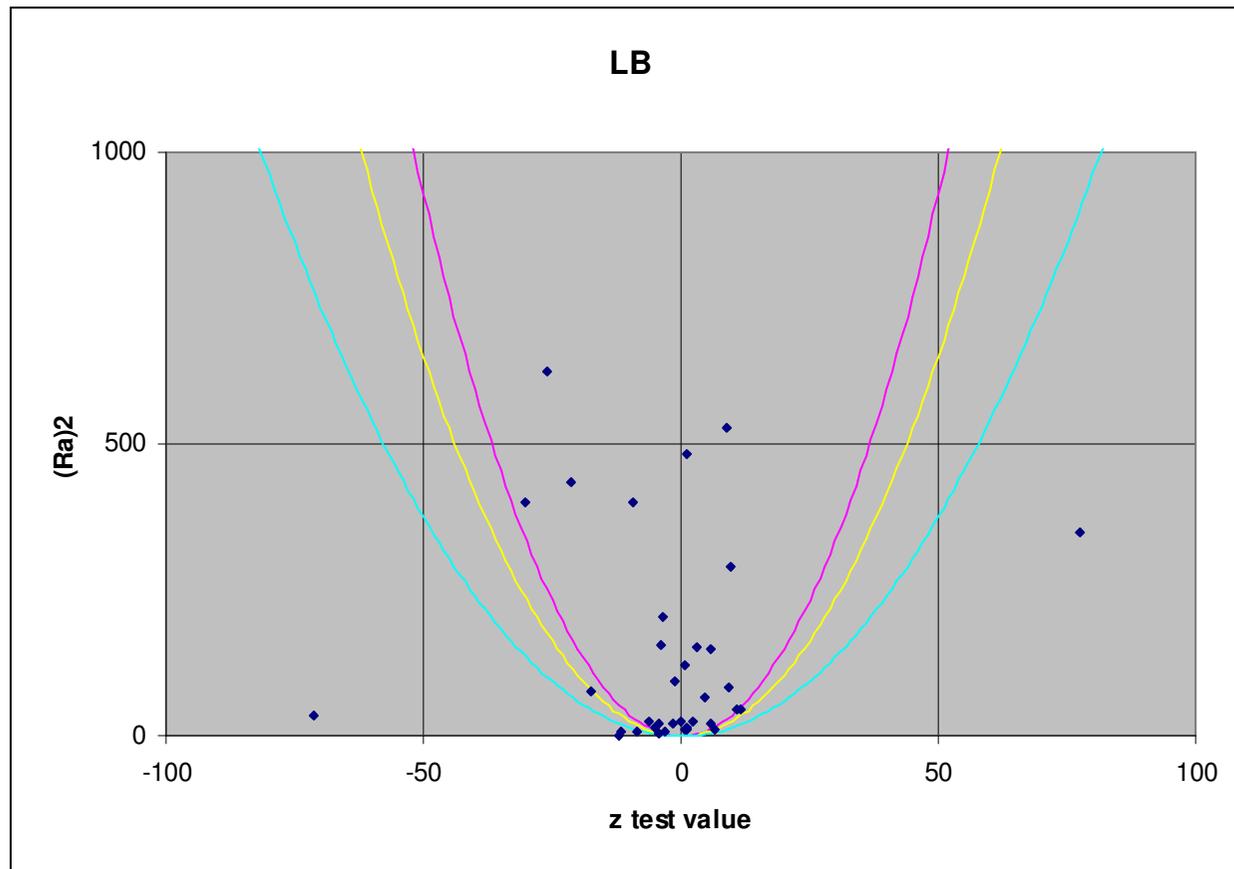
Mean deviation LB with 99% confidence limits



Median deviation LB



Naji plot LB



Thank you