Surface Activity Measurements In Situ at Ringhals NPP

NKS Seminar september 2009

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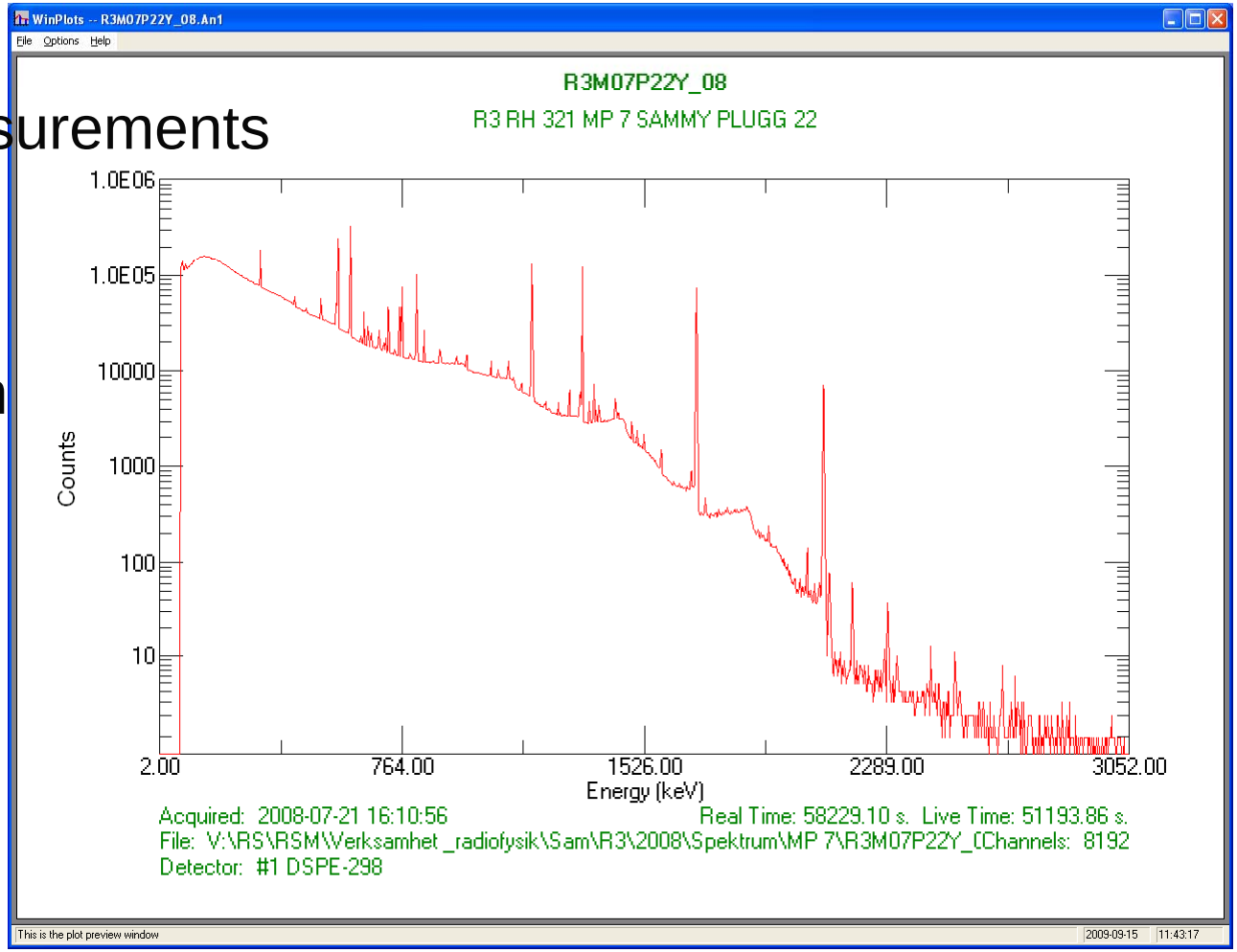

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Purpose of the measurements

- The measurements are done to follow the deposition of corrosion products inside pipes, vessels and heat exchangers.
- This is important, especially for radiological protection and chemistry to minimize doses to the workers. Increased deposition will lead to higher collective doses.
- Changes during the operating cycle of the reactor might change the radiological environment.

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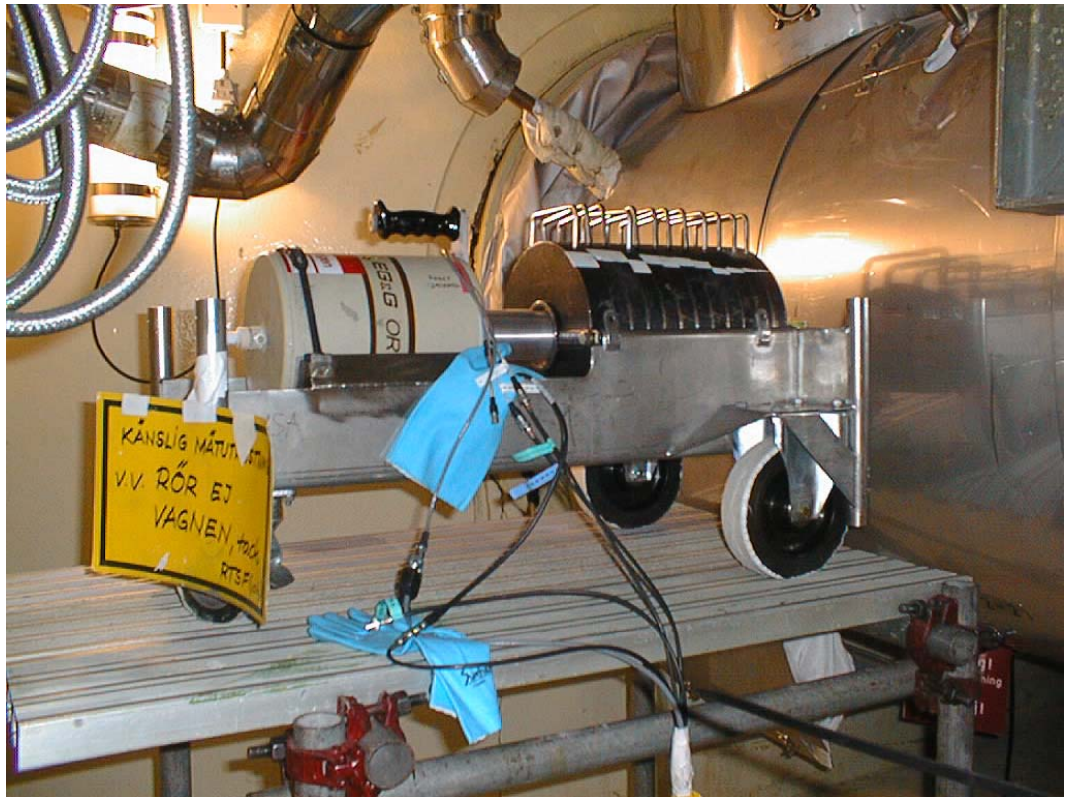
Measurement



- Acquisition time ~ 1-2 days including background measurement

~~Nuclide library~~

	Be- 7
	O- 19
Mn- 54	Cr- 51
	Co- 57
Fe- 59	Zn- 65
	As- 76
Co- 58	Nb- 94
	Ru- 103
Co- 60	Ru- 106
	Ag- 108m
Zr- 95	I- 131
	I- 132
Nb- 95	I- 133
	Cs- 134
Ag- 110m	Cs- 136
	Cs- 137
Sn- 113	Ba- 140
	La- 140
Sb- 122	Ce- 141
	Ce- 144
Sb- 124	Pr- 144
	Eu- 152
Sb- 125	Hf- 181
	Ta- 182
	W- 187
	Np- 239

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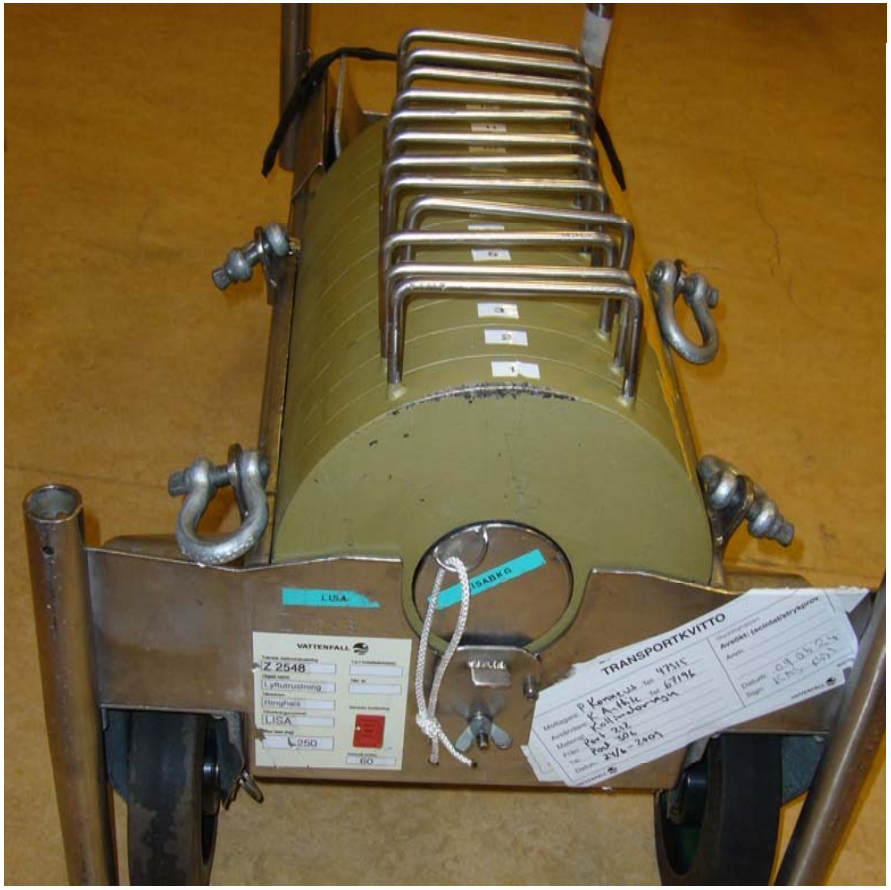
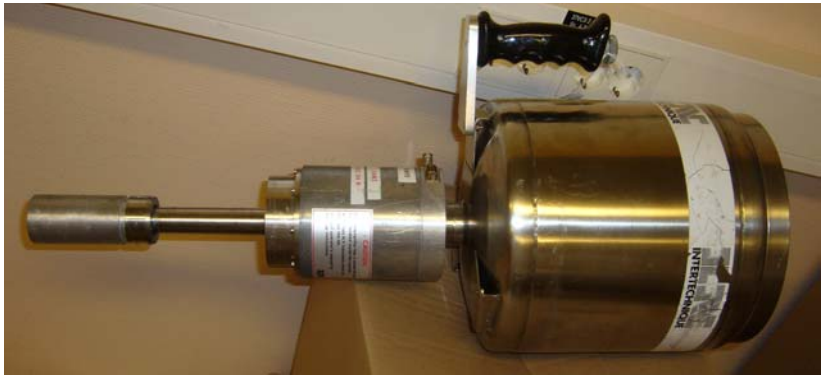
Equipment



HPGe-Detector, rel eff between 4-8%



Collimators (30, 22, 12mm and background)

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Efficiency Calibration

$$\mathbf{eff_{abs} = eff_{int} * eff_{geo}}$$

eff_{int} – intrinsic efficiency for the detector

Performed in the laboratory with a surface source of Eu-152

eff_{geo} – calculated correlation between the surface source calibration (eff_{int}) and the real geometry for the measured sample

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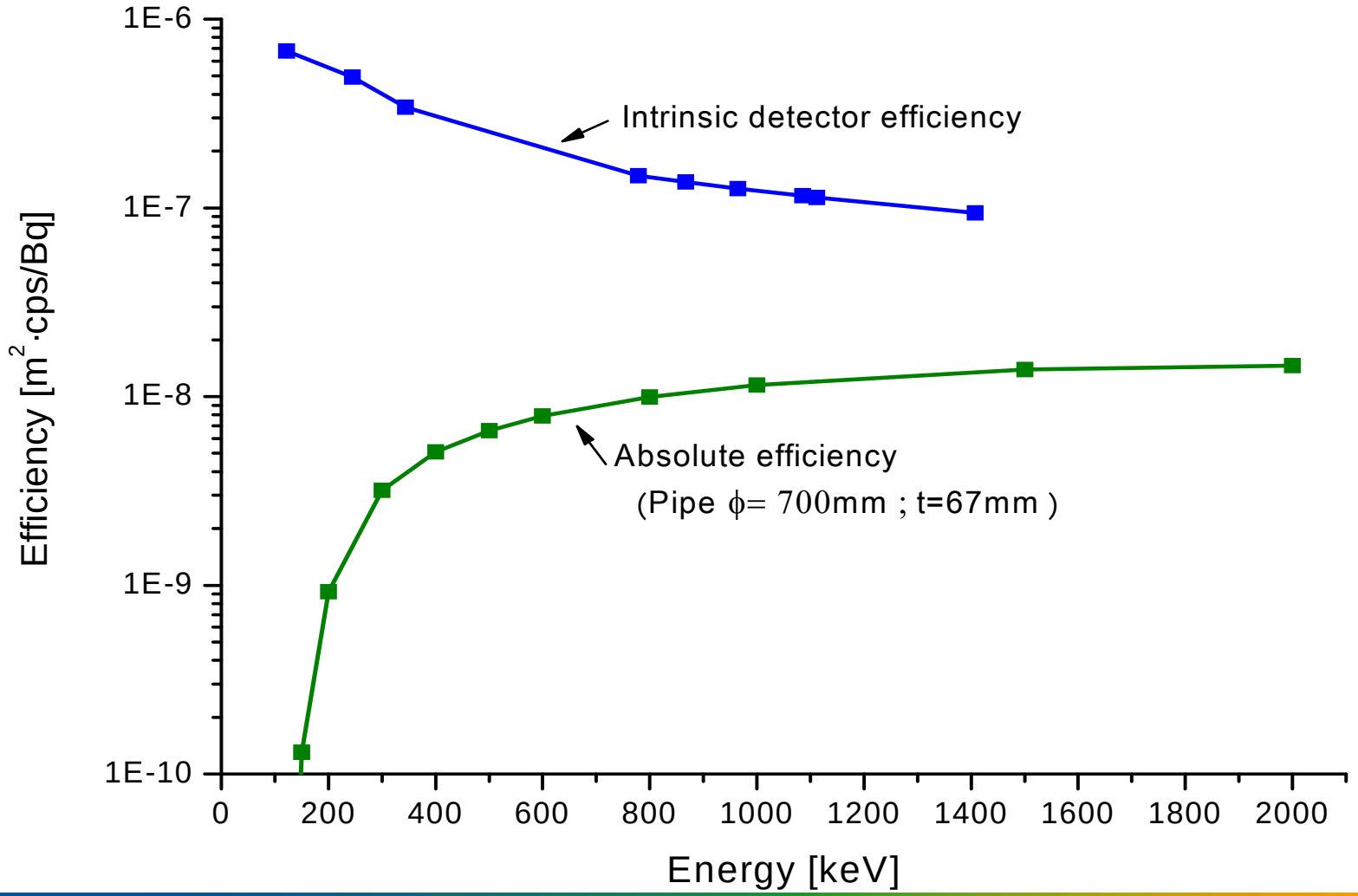
Efficiency calibration



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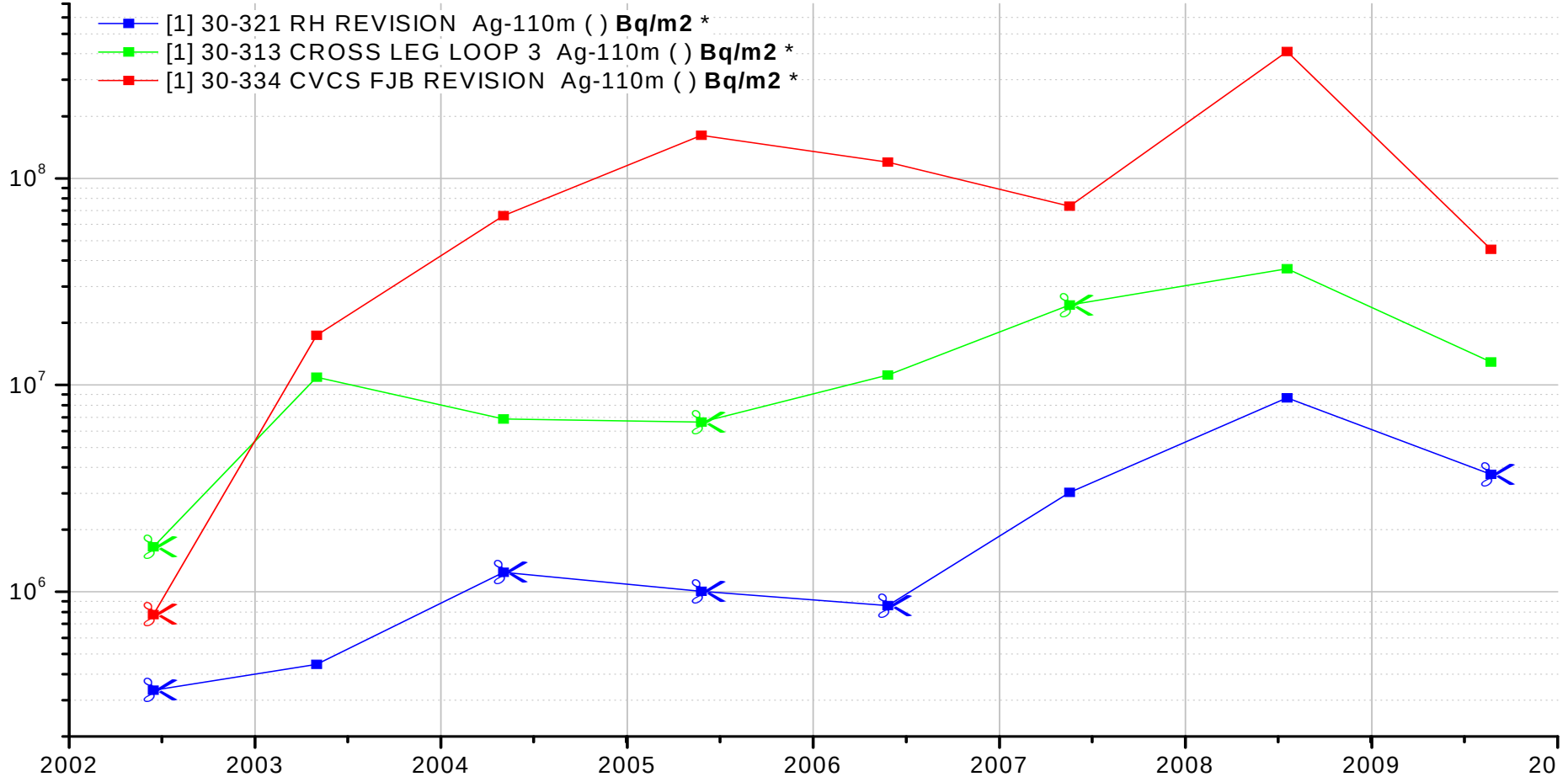
SAM - RINGHALS 3

(1)

Ag-110m



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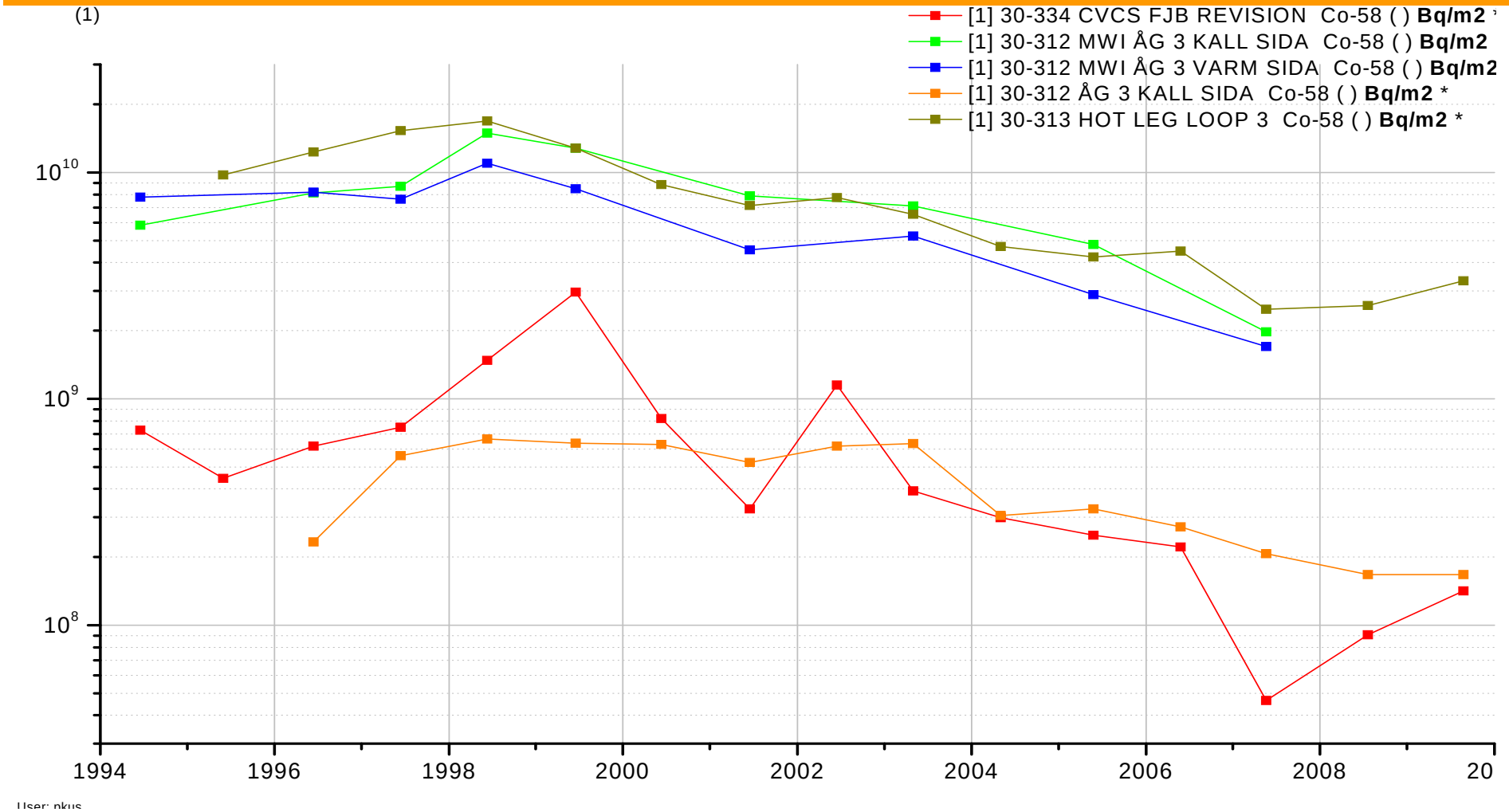
SAM - RINGHALS 3

Co58



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Thank you for your attention!

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