Ringhals - ALARA Performance Indicators

ISOE European Symposium 2014 Bern, April 9

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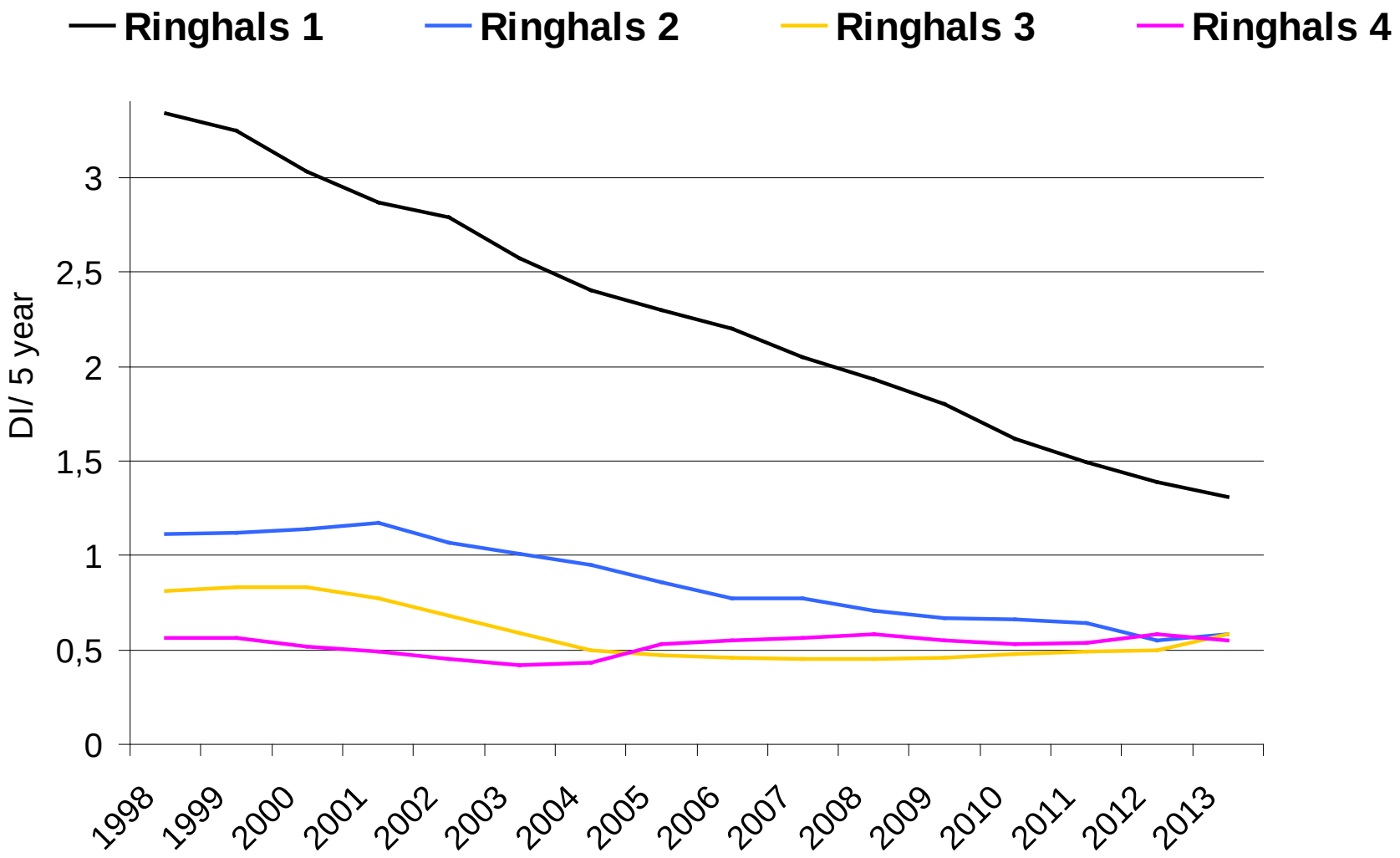
Ringhals Dose Rate Index (DI) - 5 year rolling average



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Ringhals objectives for using CRE as ALARA PI

- **The indicator should be a driver to reduce the collective and individual dose:**

  - Flexible and challenging!

  - CRE needs to reflect the departments ALARA-plans and outage goals

  - Comparasion with a relevant selection of plants

  - Consideration taken to plant design and source term

WANO PI - CRE

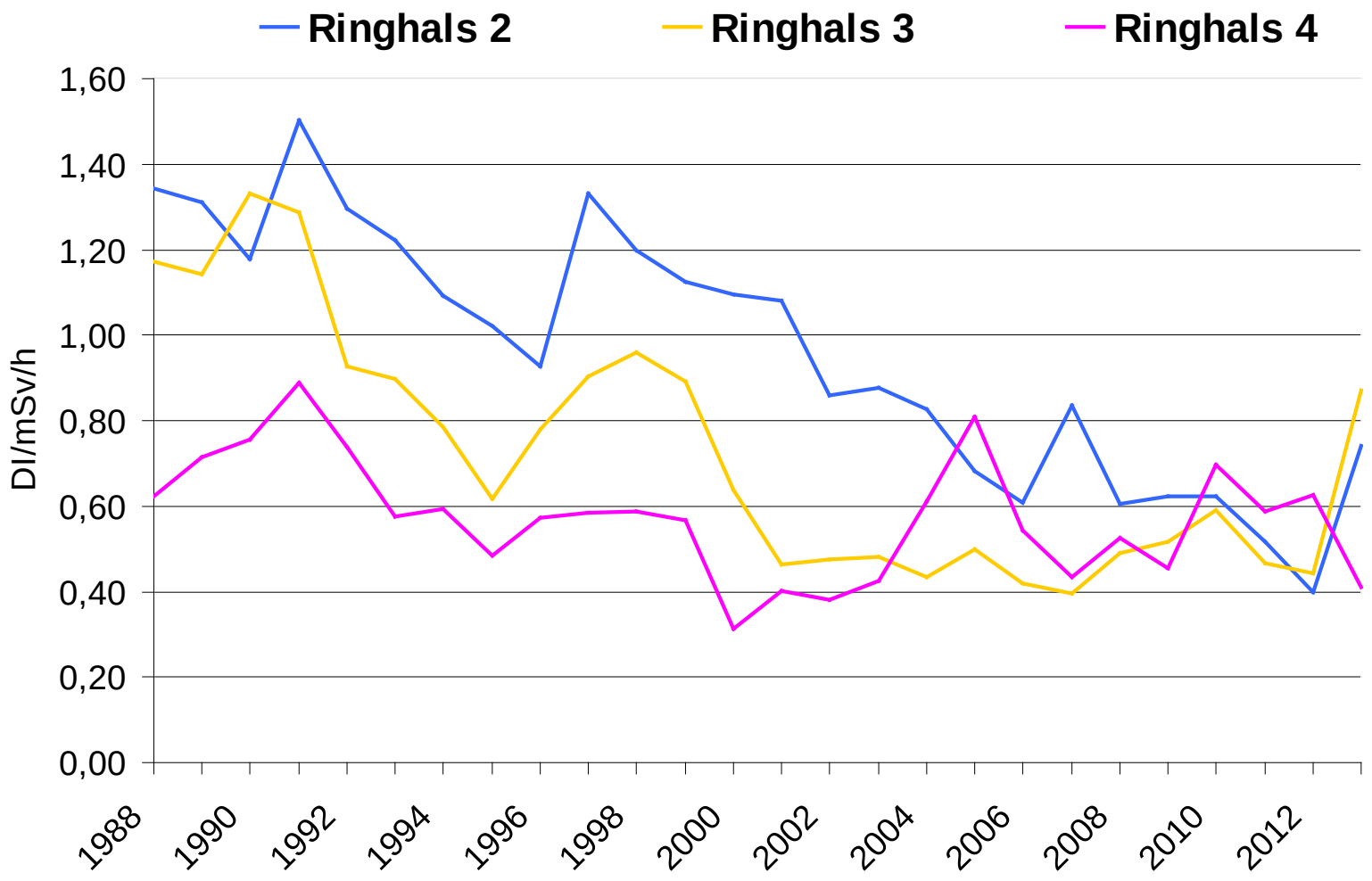
Reactor Type: Cycle Lenght (months): Reporting Centre: Result Period (months):	PWR 12 Paris 12	PWR 12 All 12	PWR All All 36	PWR All All 12	PWR+BWR 12 All 12
Median Best Quartile Worst Quartile	0,34 0,14 0,74	0,57 0,29 0,86	0,56 0,42 0,72	0,53 0,28 0,82	0,6 0,39 1,0
R2 2012	0,68				
R3 2012	0,283				
R4 2012	0,655				

Considerations: lack of information about what type of work has been carried out, plant design and source term.

How low is reasonable achievable?

Source Term

DI – per year for Ringhals PWR units



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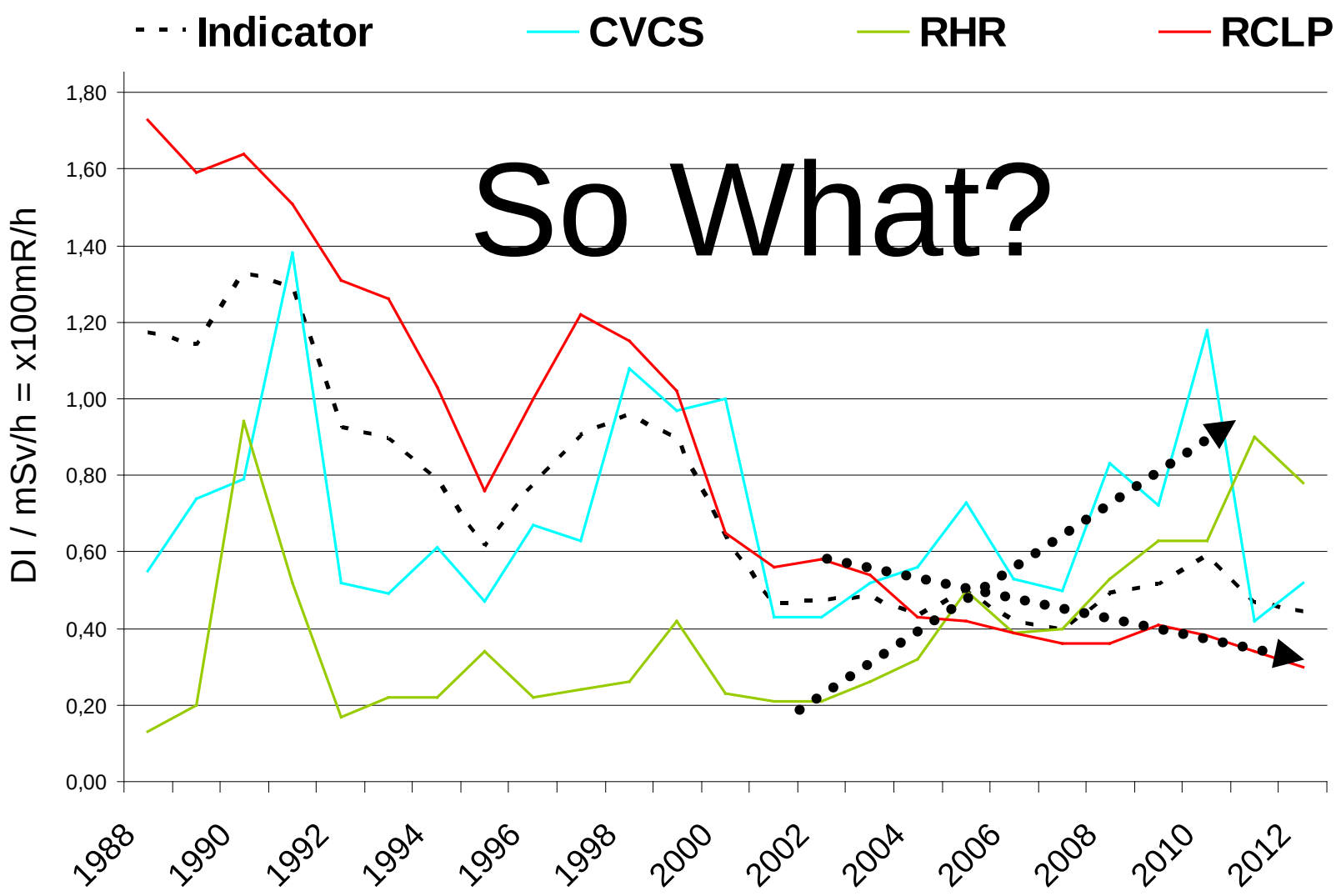
DI – Ringhals Unit 3



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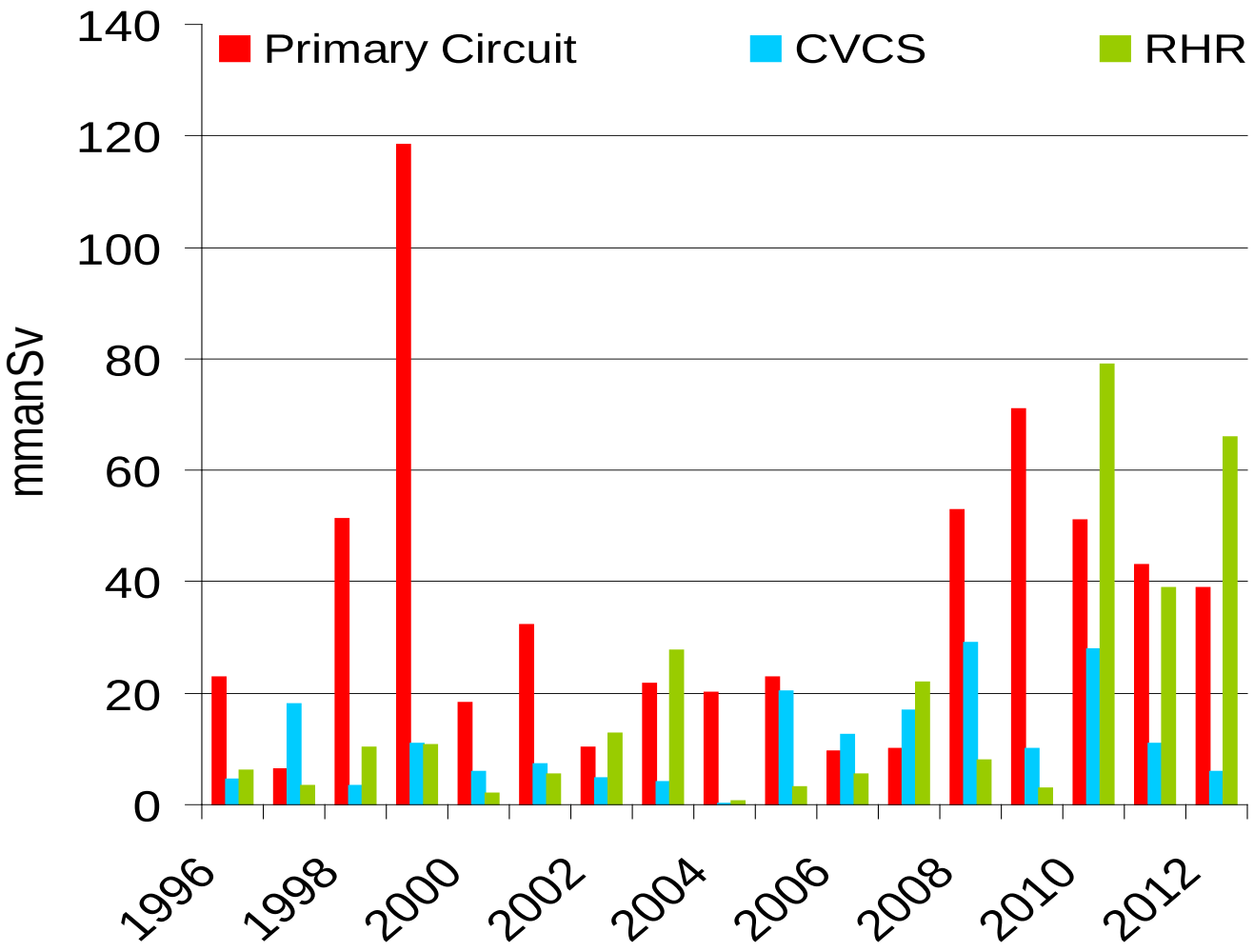
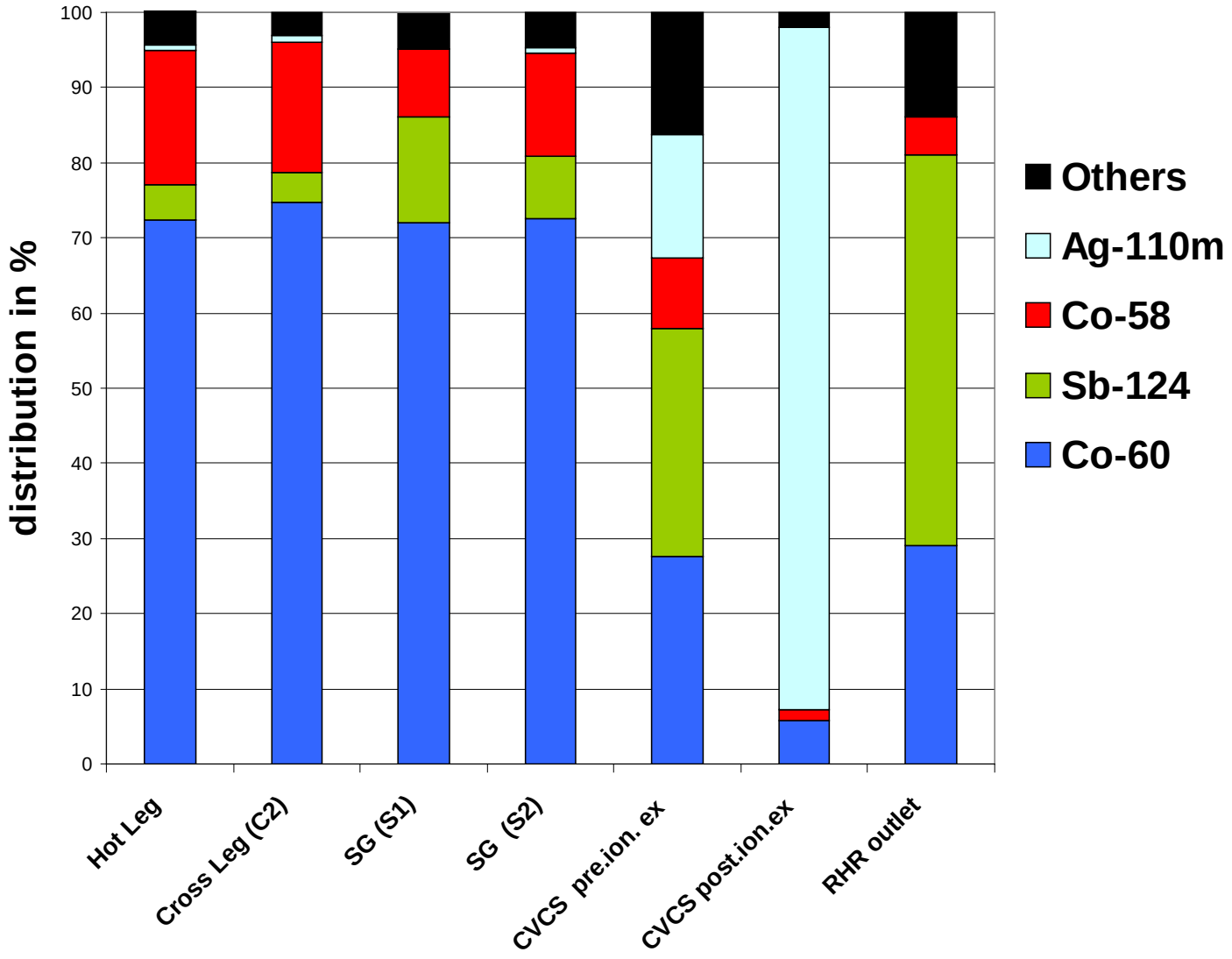
Collective Dose per Job – Ringhals 3 (ISOE madras)

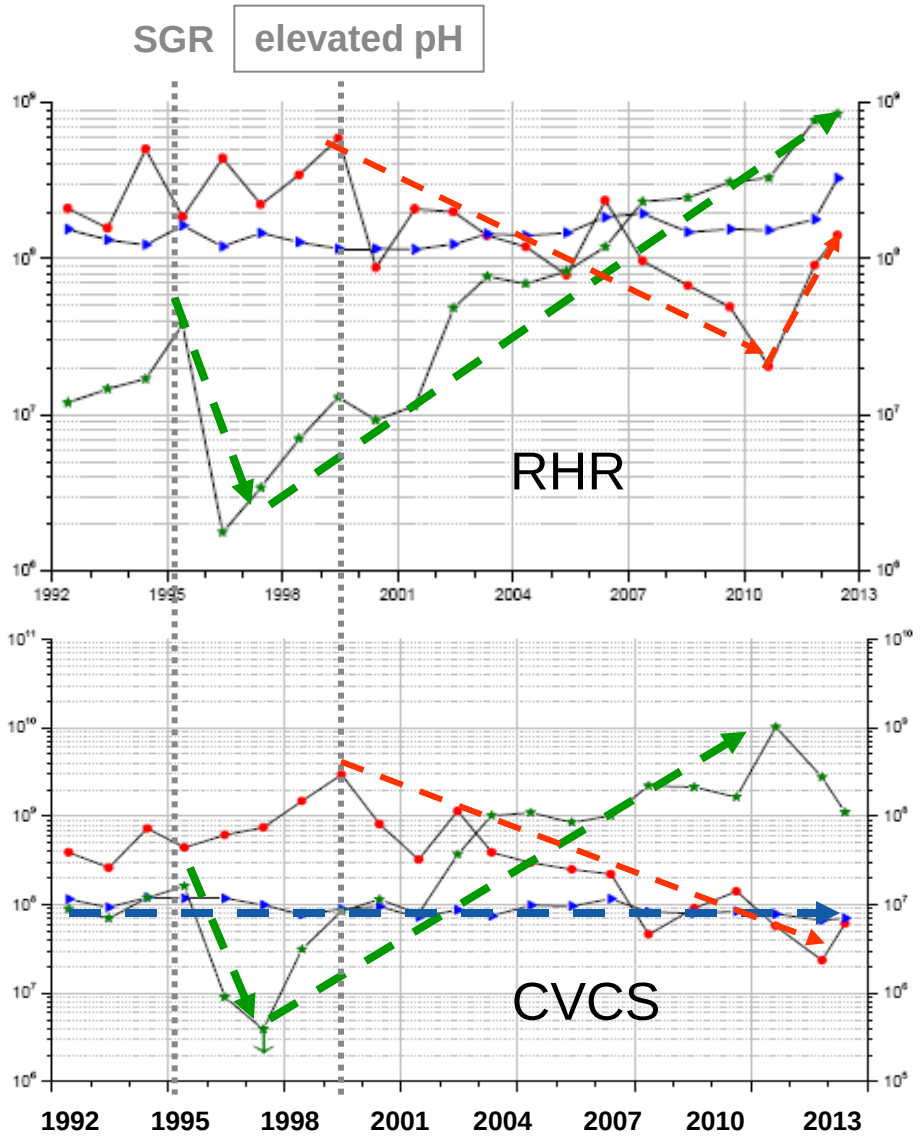


Dose Rate Contributors – Ringhals 3 (2012)



Surface Activity Measurements - Trending data for Unit 3

▲ = Co-60 ★ = Sb-124 ● = Co-58



Method to measure the impact of:

- optimized chemistry

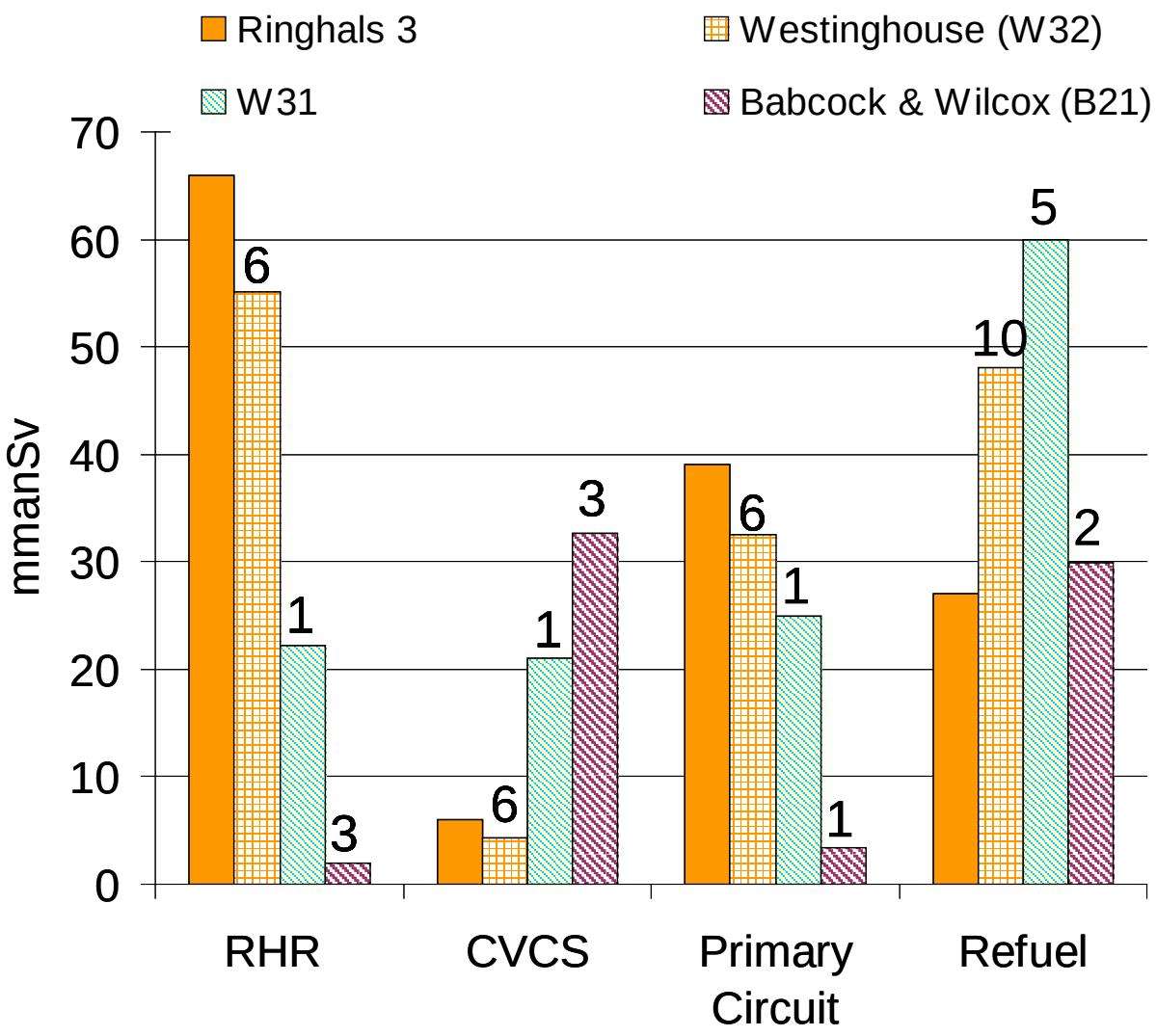
- shut down release control

- fuel performance

- source term and radiation field reduction - primary circuit versus other low flow areas

Industry performance?

Collective Dose per Job Benchmarking – (ISOE madras)



Possible to compare for a plant unit with its sister group and other sister unit groups

<u>Considerations:</u>

- lack of reported data

- no information about type of data?

- lack of information about dose rates/source term

- variations in amount and type of work

Summary

- CRE ranking… accurate ALARA performance indicator?
  - Does best quartile mean good enough?
  - If in best quartile might be hard to get supprt for further RP improvements

- Improvements can be made for industry possibilities to benchmark source term management and performance
  - Collection and reporting of data
  - Evaluation effect of source term and radiation field reduction efforts

Questions?