

Enclosure 17

Memo from Donald G. Naujock
To
Terence L. Chan

Dated August 26, 2008

PDI/NRC Meeting

PNNL Work in Support of PTS Rule Associated with Flaw Sizing Error

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Fred Simonen

May 9, 2008

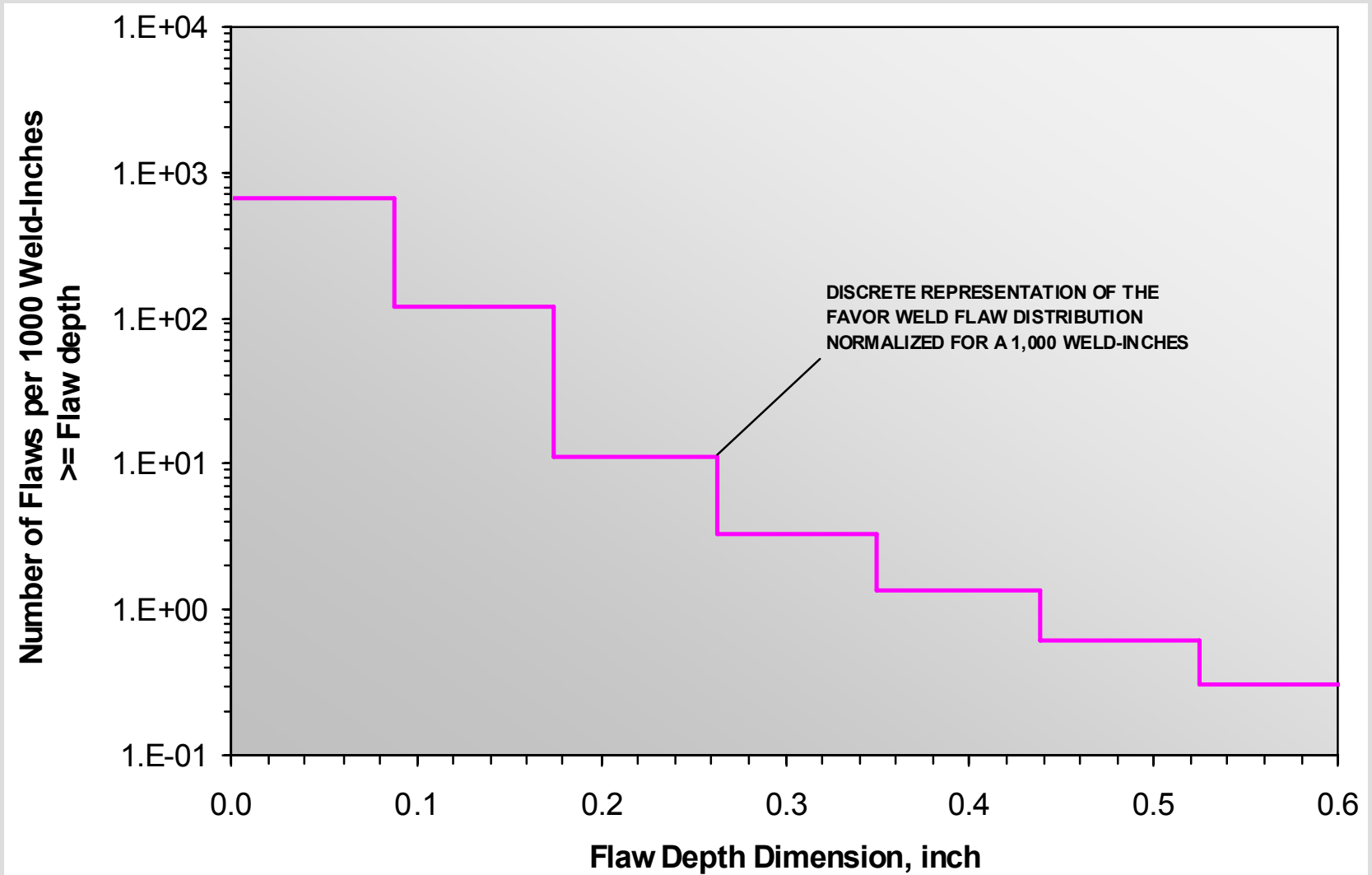
Statement of the Problem

- ▶ PNNL developed flaw distribution data based on “optimum” laboratory NDE and validation through destructive testing
- ▶ PNNL data used for FAVOR code calculations but based on bins of 1% of wall thickness
- ▶ ASME Code Appendix VIII Supplement 4 requirements based on 0.15 inches RMSE
- ▶ But also largest over sizing is for smallest flaws and largest under sizing for largest flaws
- ▶ Field data will contain flaw sizing errors that will impact distribution and how to account for these using bin process contained in PTS Rule

PTS Rule Weld Flaw Sizing Distribution Based on ISI Results

ASME Section XI Flaw Size per IWA-3200	Range of Through-wall Extent (TWE) of Flaw [in.]	Allowable Number of Cumulative Flaws per 1000 Inches of Weld Length in the ASME Section XI Appendix VIII Supplement 4 Inspection Volume
0.05	$0.025 \leq \text{TWE} < 0.075$	Unlimited
0.10	$0.075 \leq \text{TWE} < 0.125$	166.70
0.15	$0.125 \leq \text{TWE} < 0.175$	90.80
0.20	$0.175 \leq \text{TWE} < 0.225$	22.82
0.25	$0.225 \leq \text{TWE} < 0.275$	8.66
0.30	$0.275 \leq \text{TWE} < 0.325$	4.01
0.35	$0.325 \leq \text{TWE} < 0.375$	3.01
0.40	$0.375 \leq \text{TWE} < 0.425$	1.49
0.45	$0.425 \leq \text{TWE} < 0.475$	1.00

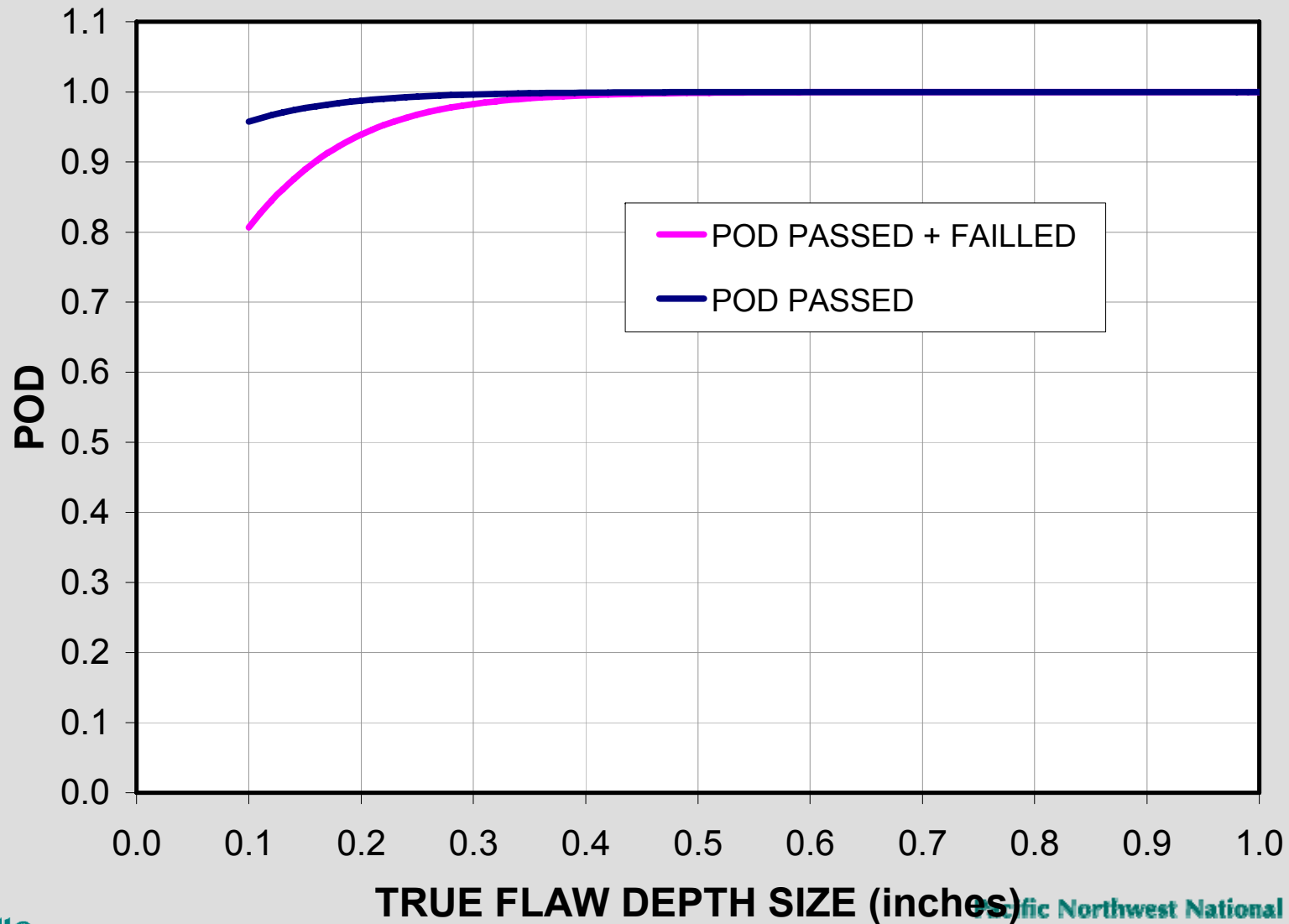
Number of Weld Flaws Used in FAVOR Code for Palisades



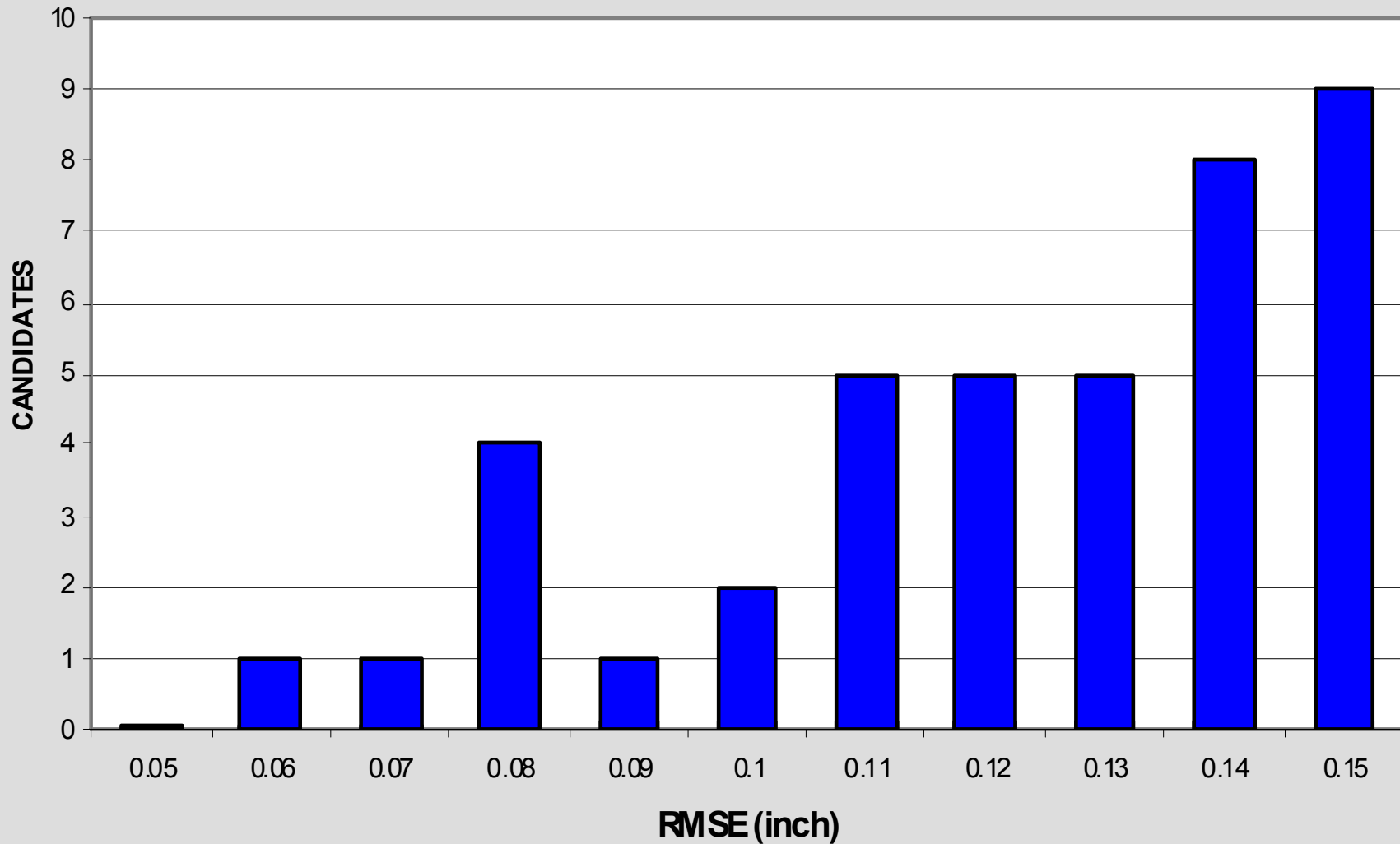
Sizing Errors for App. VIII Supplement 4

- ▶ Becker published data at the Seville Conference in 2001 and then at the IAEA meeting in Petten in 2002
- ▶ This was the only reference data we could find to use
- ▶ This contained detection and sizing performance data of the first 41 examiners that had successfully passed the requirements.

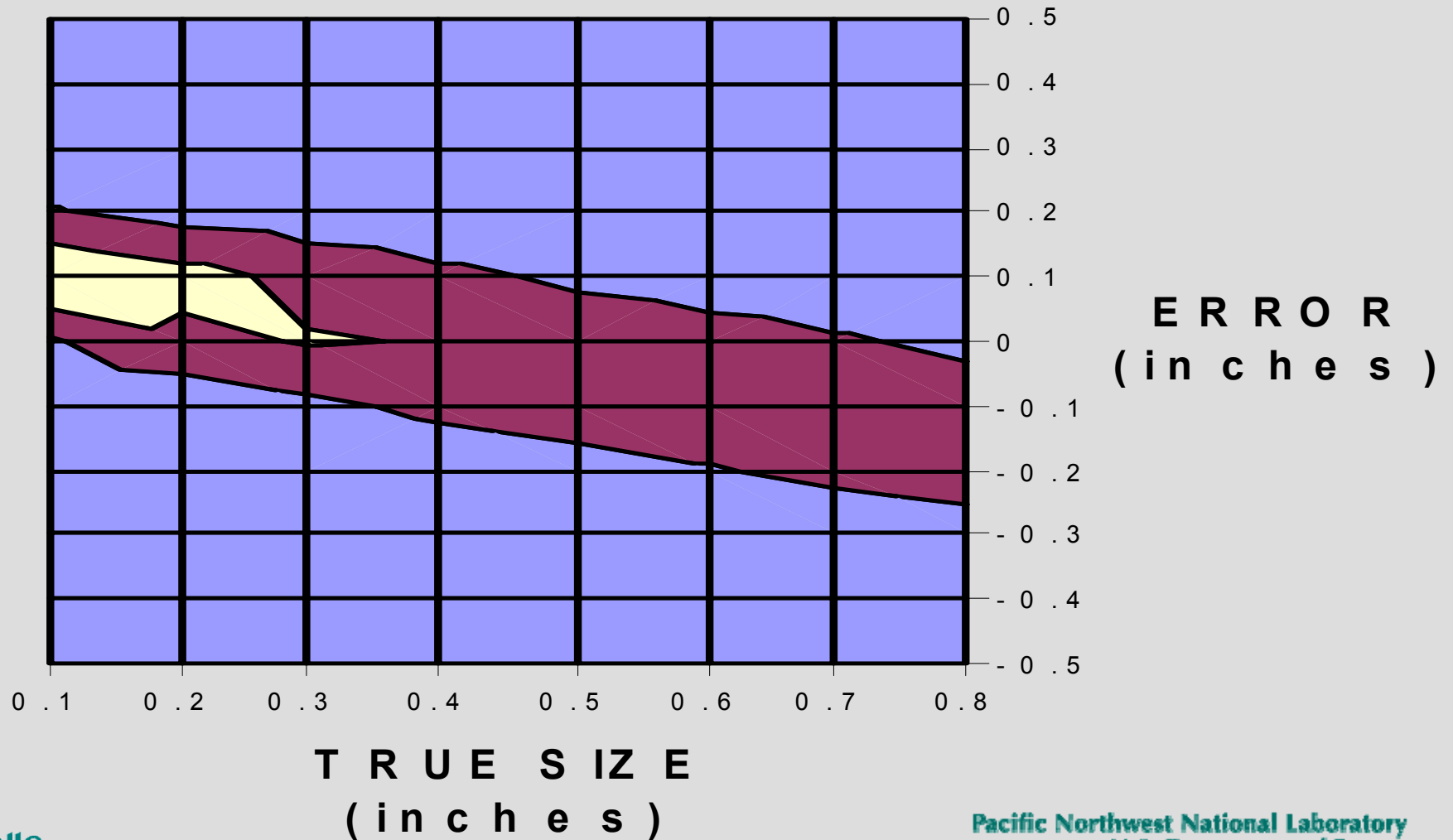
POD for Supplement 4 (Becker)



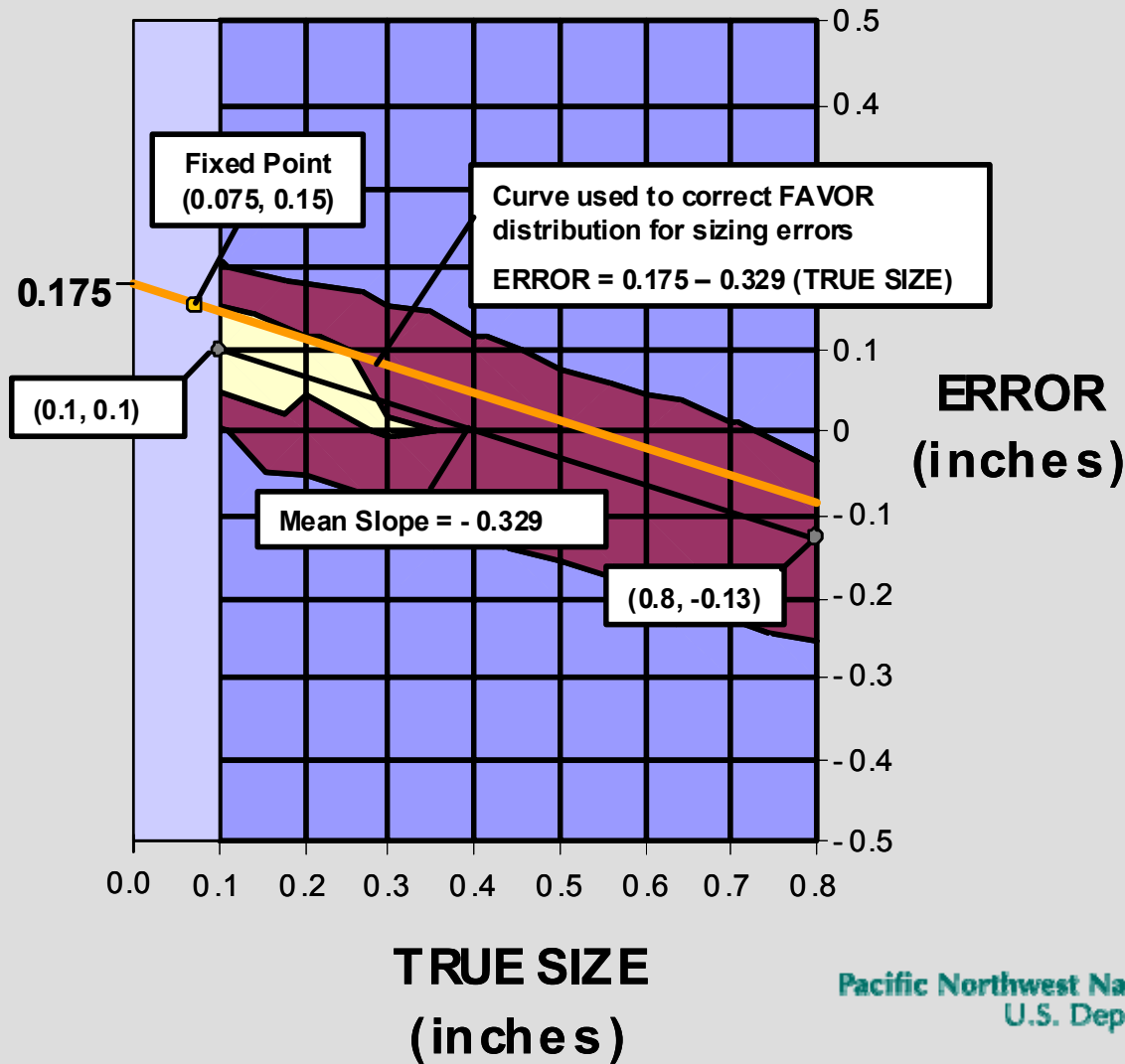
Depth Sizing Performance of Successful Candidates (Becker)



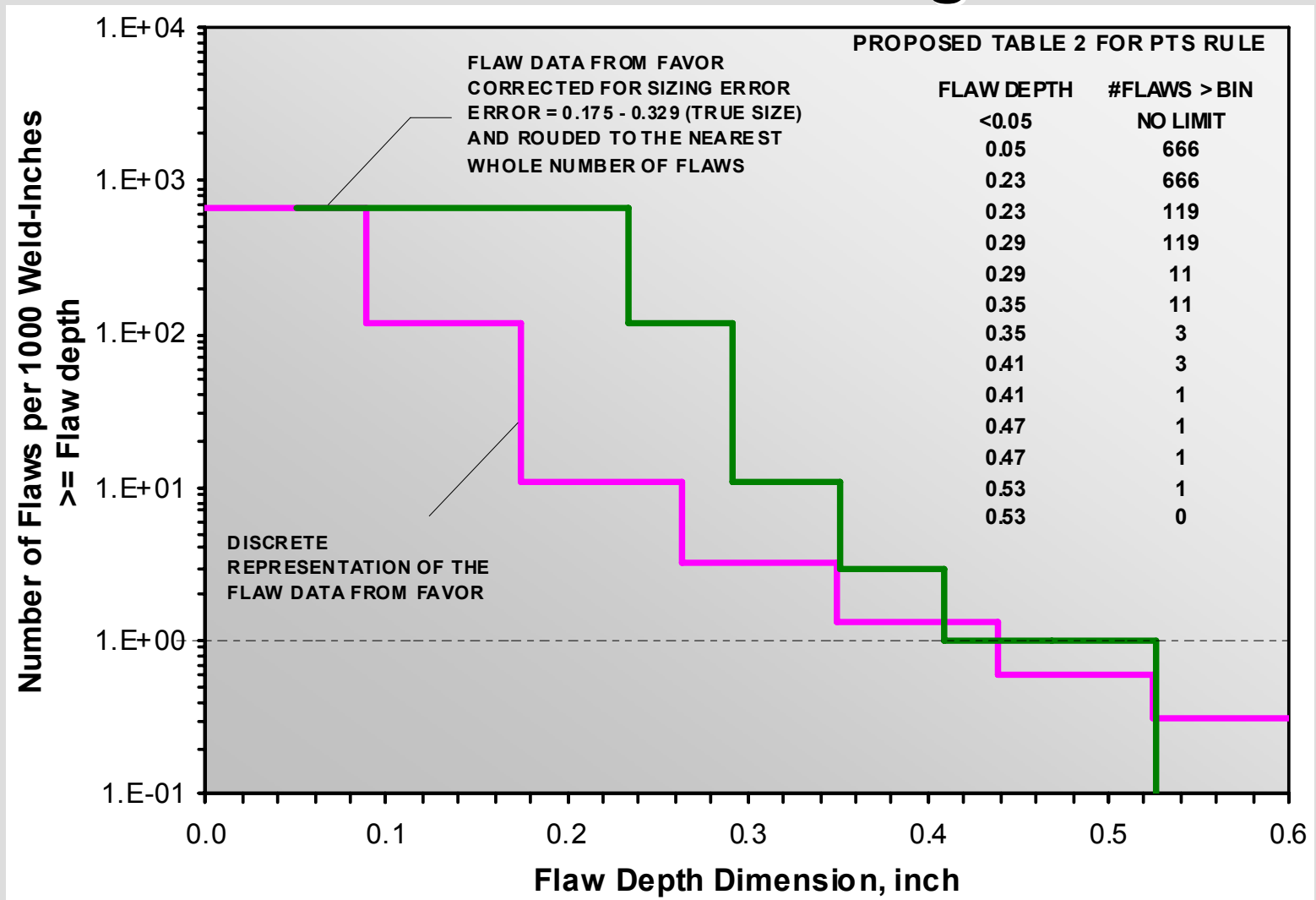
Supp. 4 Successful Candidate Flaw Sizing Error vs. True Flaw Size (Becker)



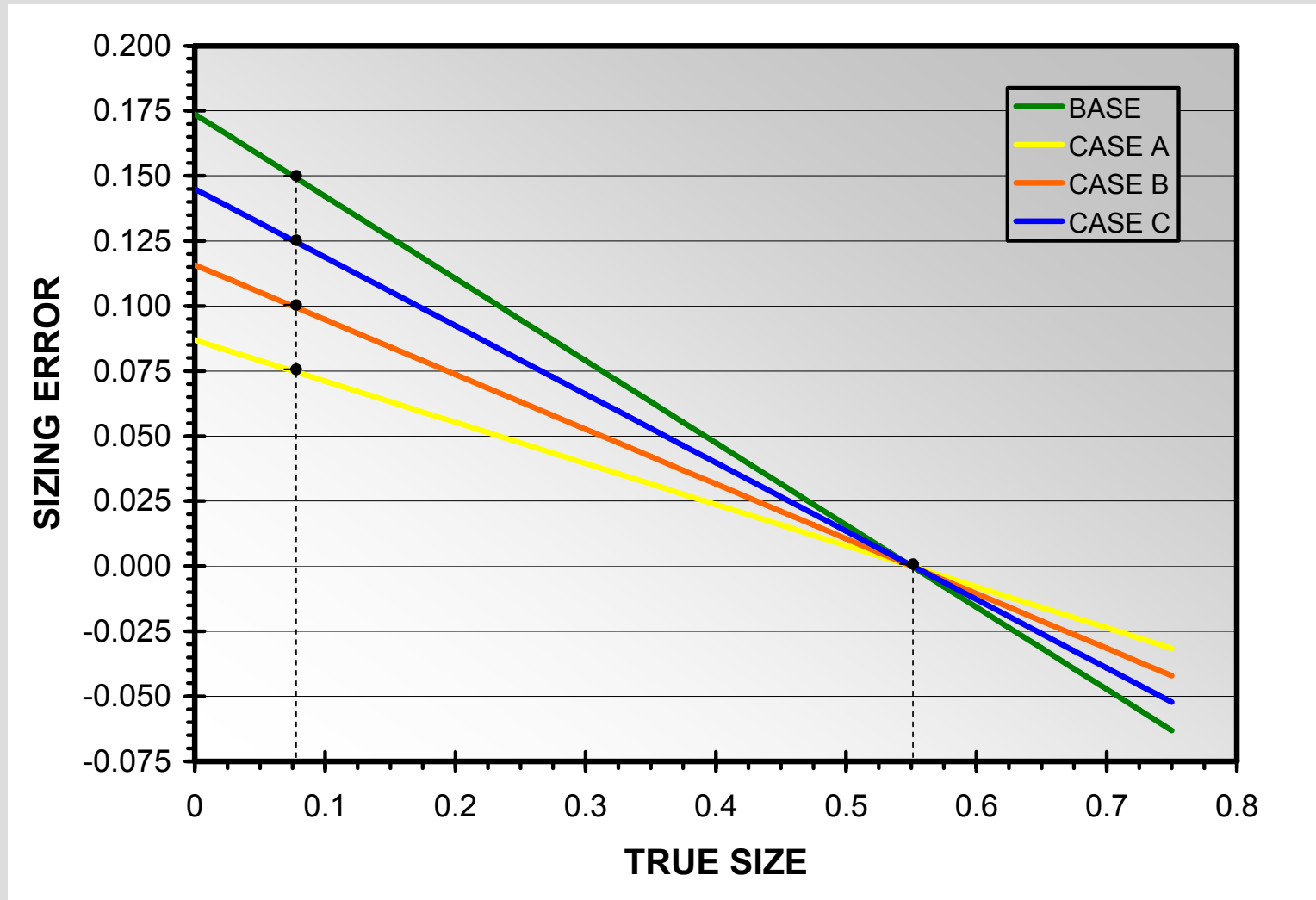
Development of Flaw Sizing Error Corrections



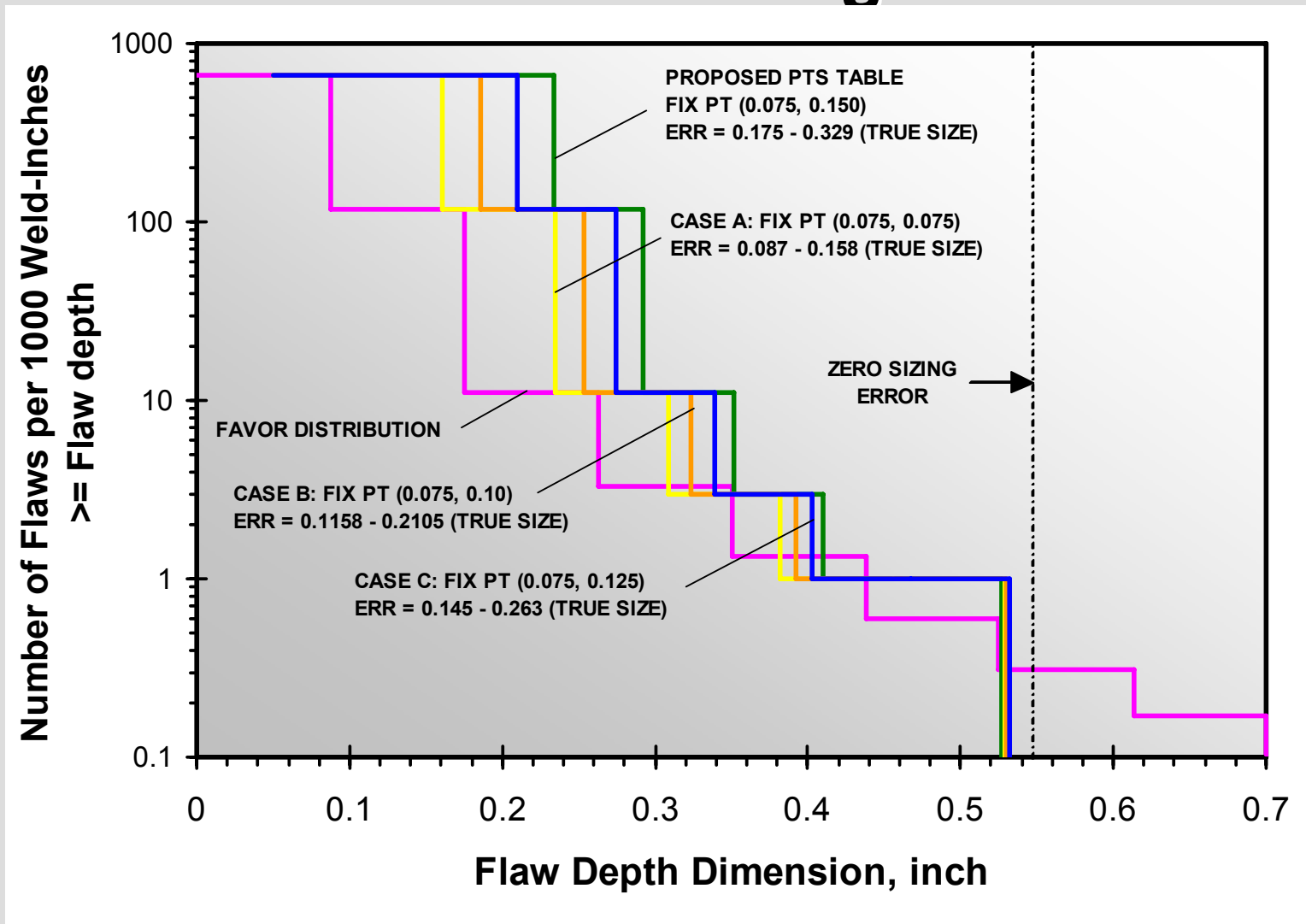
Acceptable Number of Weld Flaws with Allowance for Flaw Sizing Errors



Additional Cases for Sizing Error That Were Considered



Acceptance Numbers of Weld Flaws with Allowance for Sizing Errors



Status

- ▶ New binning of weld flaws provided to ORNL
- ▶ Results only shown for weld flaws but similar analysis was performed for plate flaws
- ▶ FAVOR calculations being run for all cases
- ▶ Results to be provided to the NRC

Conclusion

- ▶ The availability of the PDI data for Supplement 4 made this work possible – although limited to just those first 41 examiners in the early 2000's
- ▶ This is a win – win for the NRC and industry
- ▶ However, it would be impactful to have this data updated for all examiners that have passed Supplement 4 to the present