

Dose Algorithm Changes Necessary to Satisfy Anticipated Revisions to the External Dosimetry DOELAP

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What Revisions?

- Adoption of ANSI N13.11
- Single standard has been long anticipated
- ANSI committees have tried to make a test standard acceptable to DOE
- In 2006 DOE announced changes to 10 CFR 835 including adoption of some or all of N13.11-2001
- When will it happen?
 - Attend THAM-B roundtable session for more

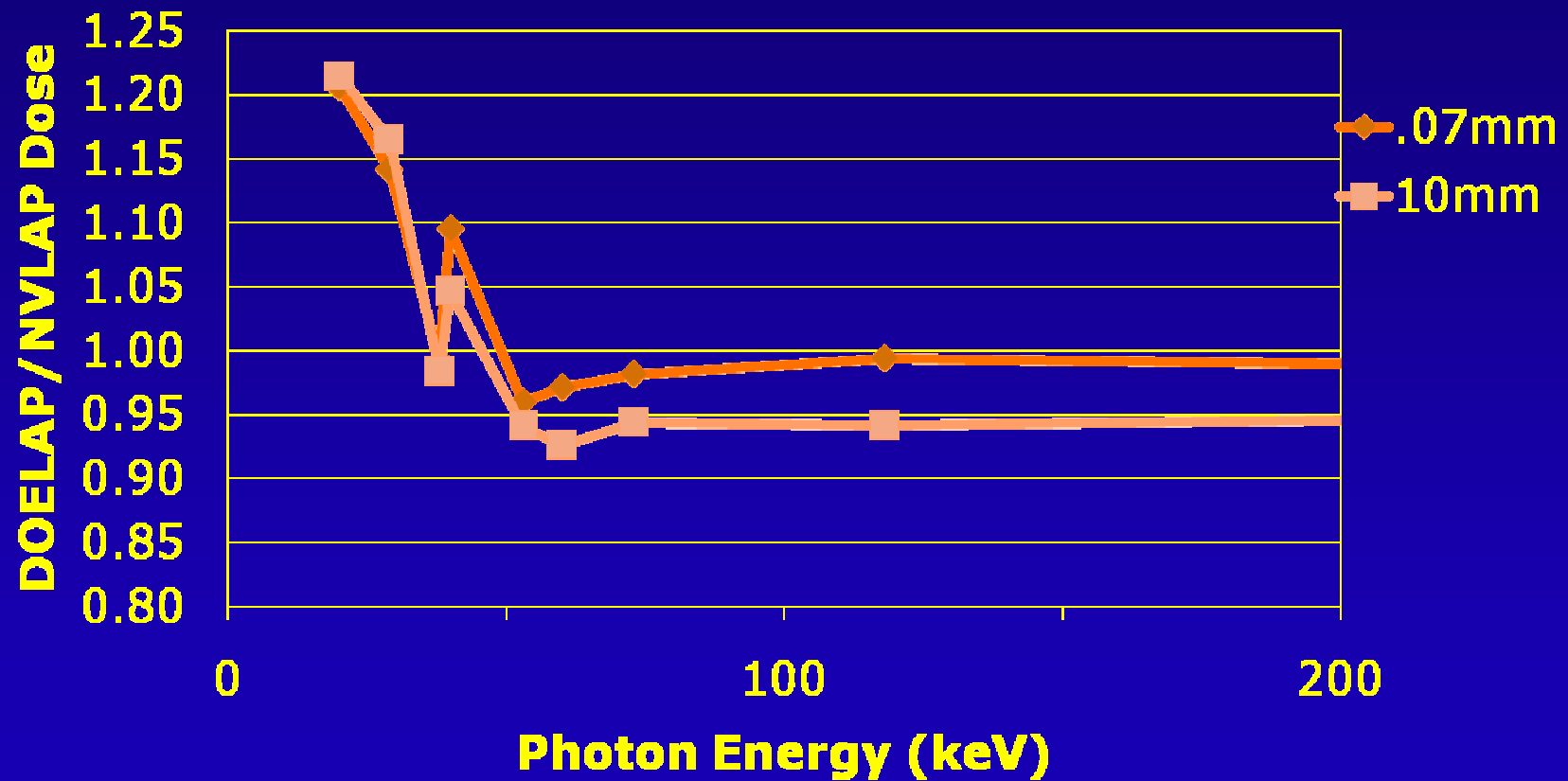


Comparison of Test Conditions

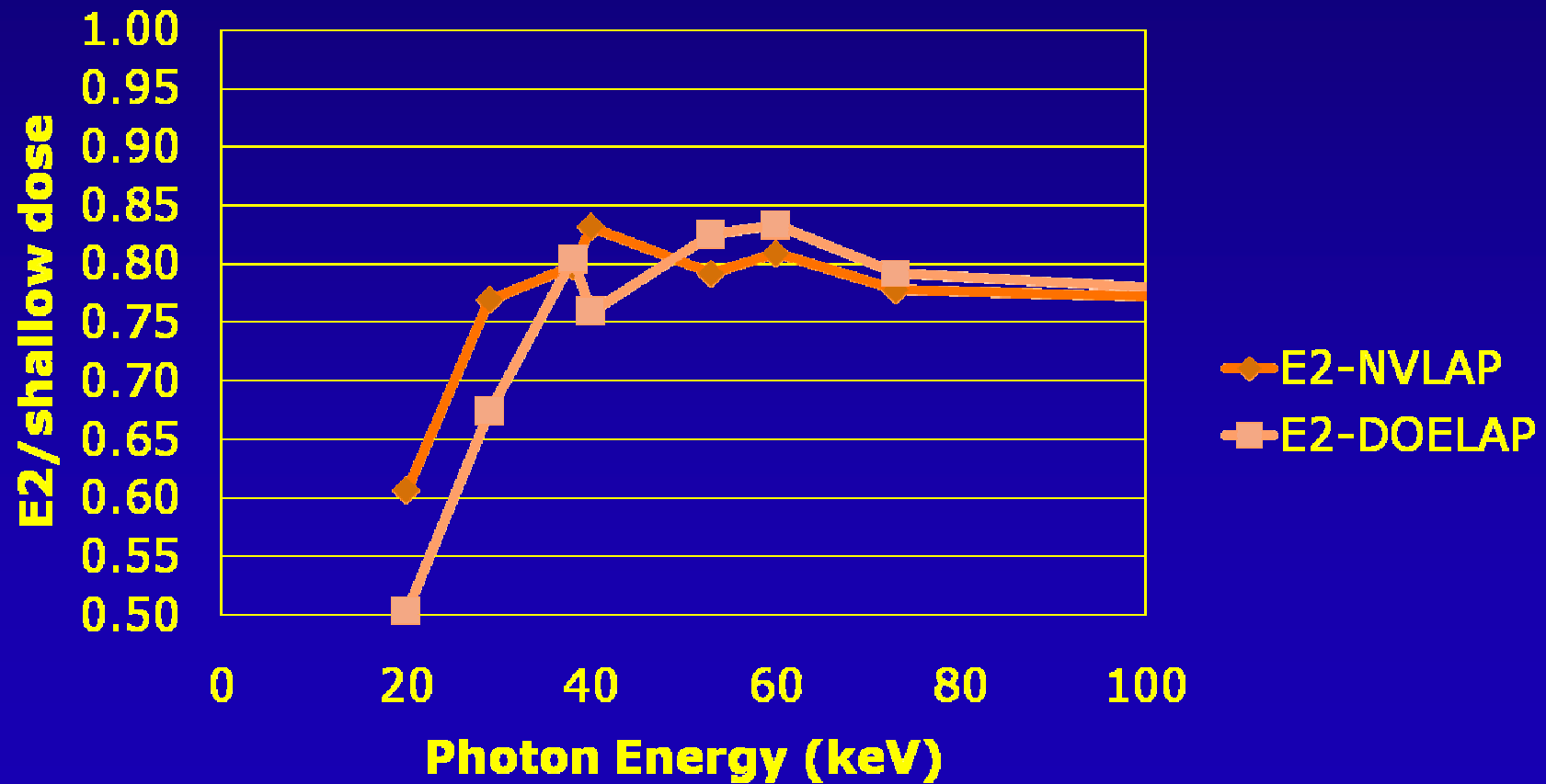
	DOE/EH-0027 (1986)	ANSI N13.11-2001
Photon fields	6 fields 20-662 keV	<ul style="list-style-type: none"> •70 fields, 20-1332 keV, •New c_k factors, •Angles for keV > 70
Beta fields	3 fields (^{204}Tl , $^{90}\text{Sr/Y}$, DU)	3 fields (^{85}Kr , ^{204}Tl , $^{90}\text{Sr/Y}$)
Neutron fields	2 fields (^{252}Cf bare, D_2O mod)	-- same --
Mixtures	<ul style="list-style-type: none"> •^{137}Cs + any x-ray, • Any photon plus neutron, • High E beta + any photon • Any beta + ^{137}Cs 	Same, with ^{60}Co as well as ^{137}Cs available for gamma source
Other		10% rule?



Ratio of Dose Conversion Factors



Example Element Response



Why Revise the Algorithm?

- New photon dose correction factors
 - 20% difference for M30
- Continuum of photon energies, not just six
 - Discrete bin-style corrections won't work
- Non-perpendicular test conditions



How to Revise the Algorithm

- Older branching style
 - Difficult to impossible
 - NVLAP processors had to adapt in 2002
- Function style algorithm
 - Revise dose correction factor functions
 - Angles OK, mixtures OK
- Hybrid branching/matrix
 - Revise dose response factors
 - Add lines for angles

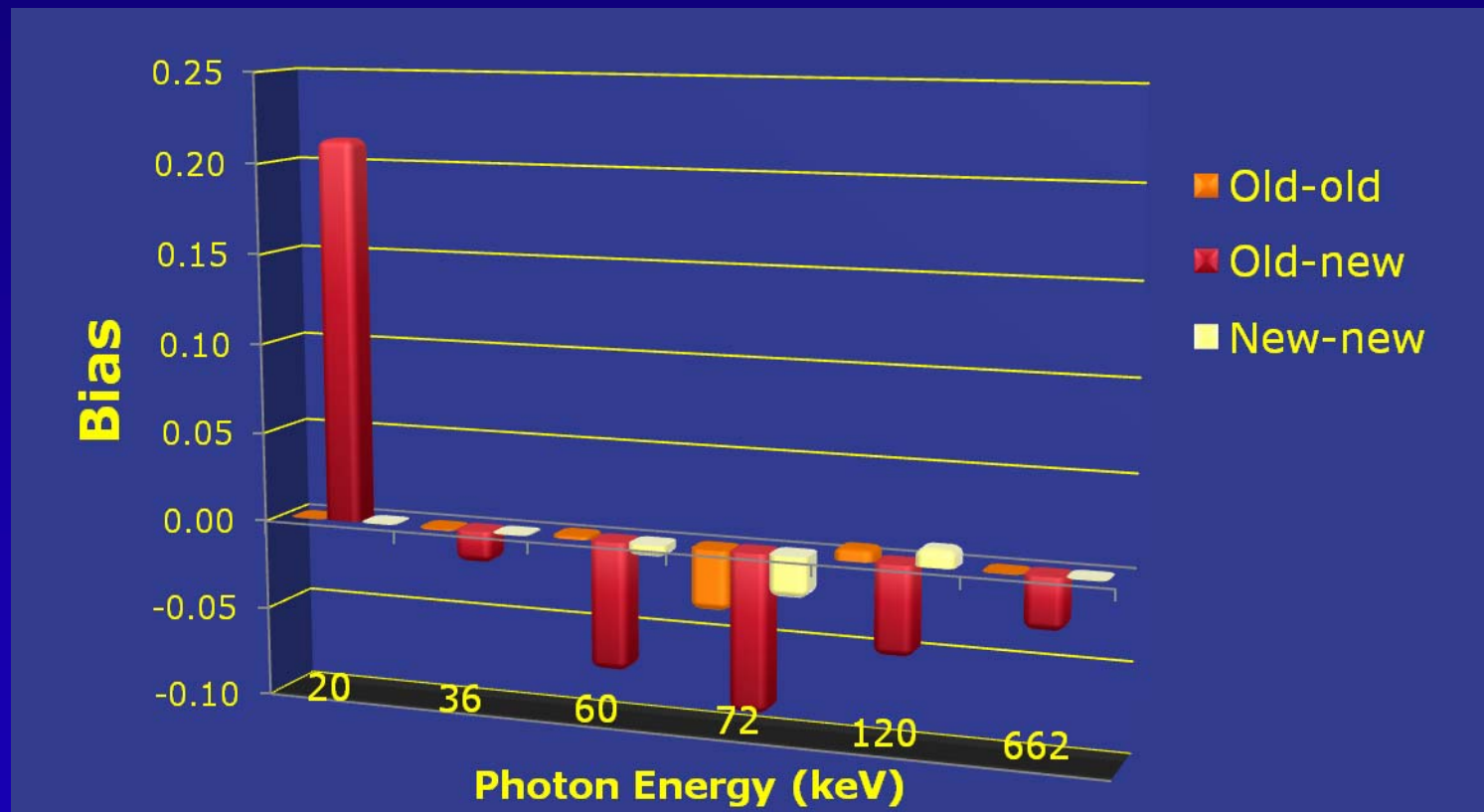


Example – Function Style

- New photon dose correction factors
 - Revise dose correction factor functions
- New photon fields
 - Accommodated with full energy range functions
- Angles
 - No changes necessary
- Mixtures
 - No changes necessary

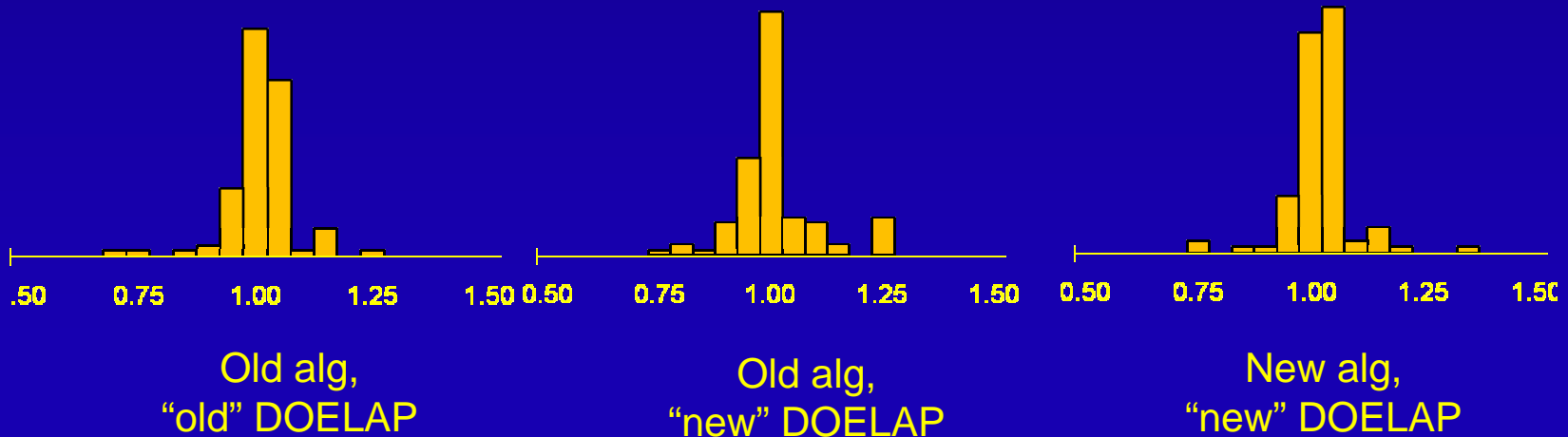


Results – Pure Photon Fields



Results – Overall Performance

Equivalent performance for 95 pure and mixed fields - photon mix, photon/beta (including $^{204}\text{Tl}+\text{x-ray}$), photon + neutron



Required Reading

“A Consistent Set of Photon Conversion Coefficients for Personnel and Environmental Dosimetry”, Chris Soares and Paul Martin (NIST), 1995

