Capillary Moisture Transport and Foundation Implications

Kohta Ueno
Building Science Corporation

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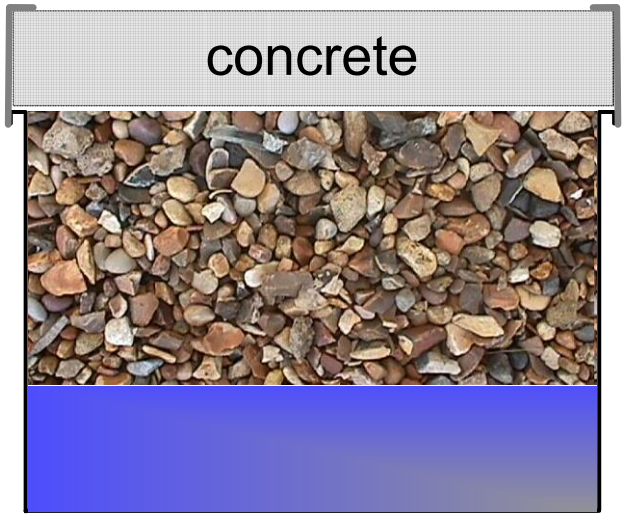
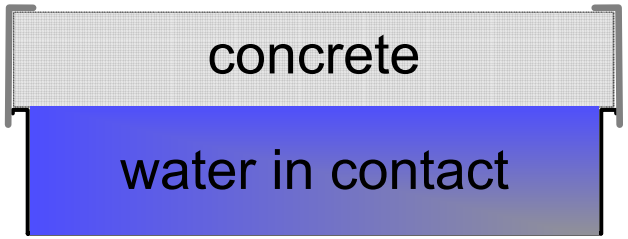
Background

- Used increasingly as finished space
- Energy use of basements (insulation)
- Moisture-related failures of basement wall systems
- Capillary moisture as part of the problem

Vapor Diffusion vs. Capillarity

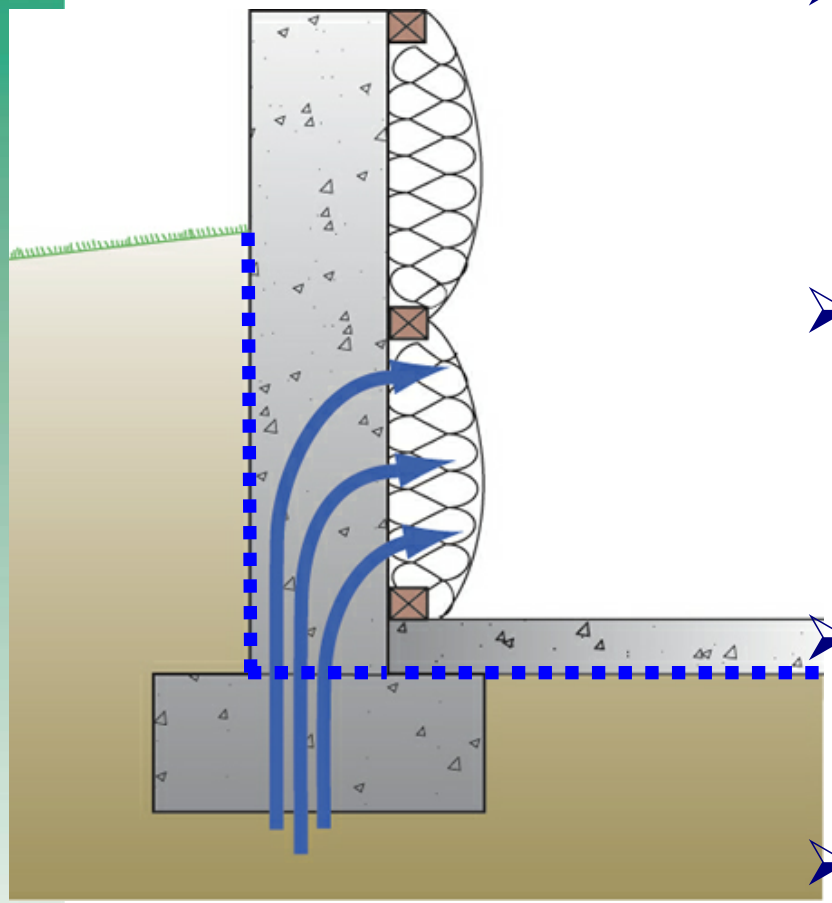


Vapor diffusion



Capillarity

Controlling Capillary Water

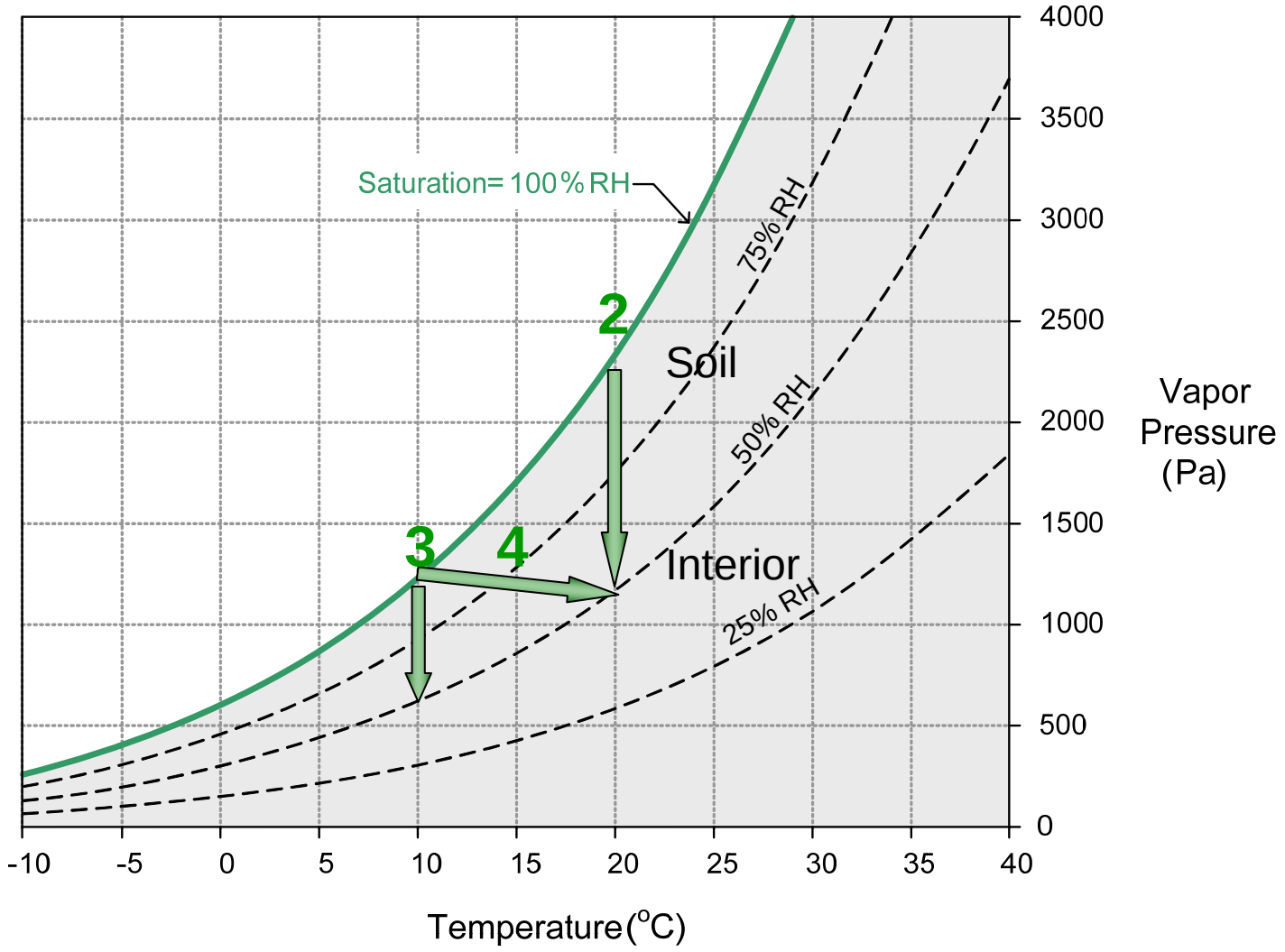


- Polyethylene under floor slab (w. free-draining fill)
- Capillary break between soil & basement wall
- Measures already in building codes
- Capillary break at footing-wall connection

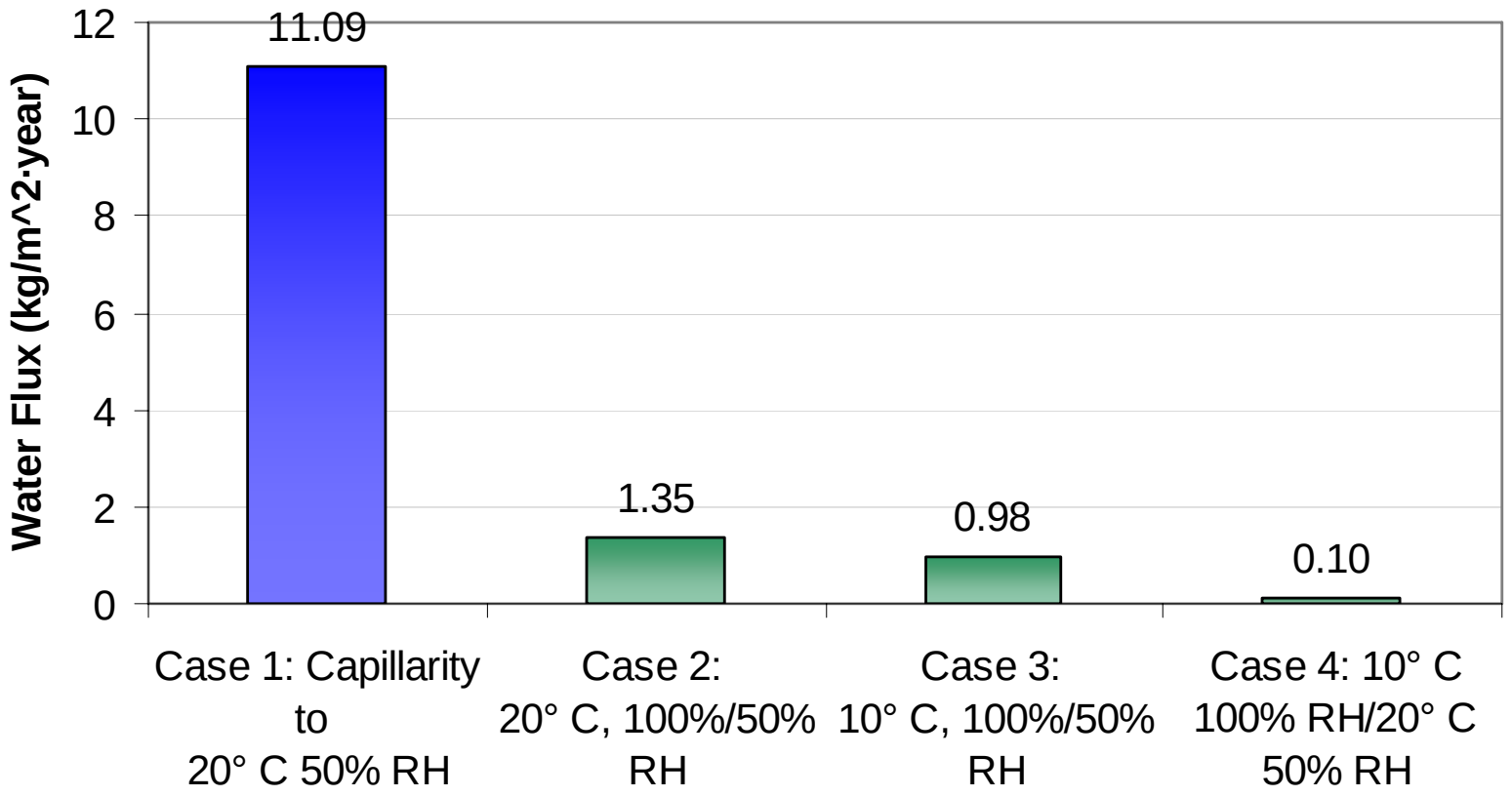
Capillarity vs. Vapor Diffusion

- 1-dimensional hygrothermal simulation (WUFI 3.0)
- 0.5 water to cement ratio concrete
- 8” thick wall; no coating on either side
- **Case 1: Capillarity (100% rain on surface)**
- **Cases 2 through 4: Vapor diffusion**

Simulation Boundary Conditions

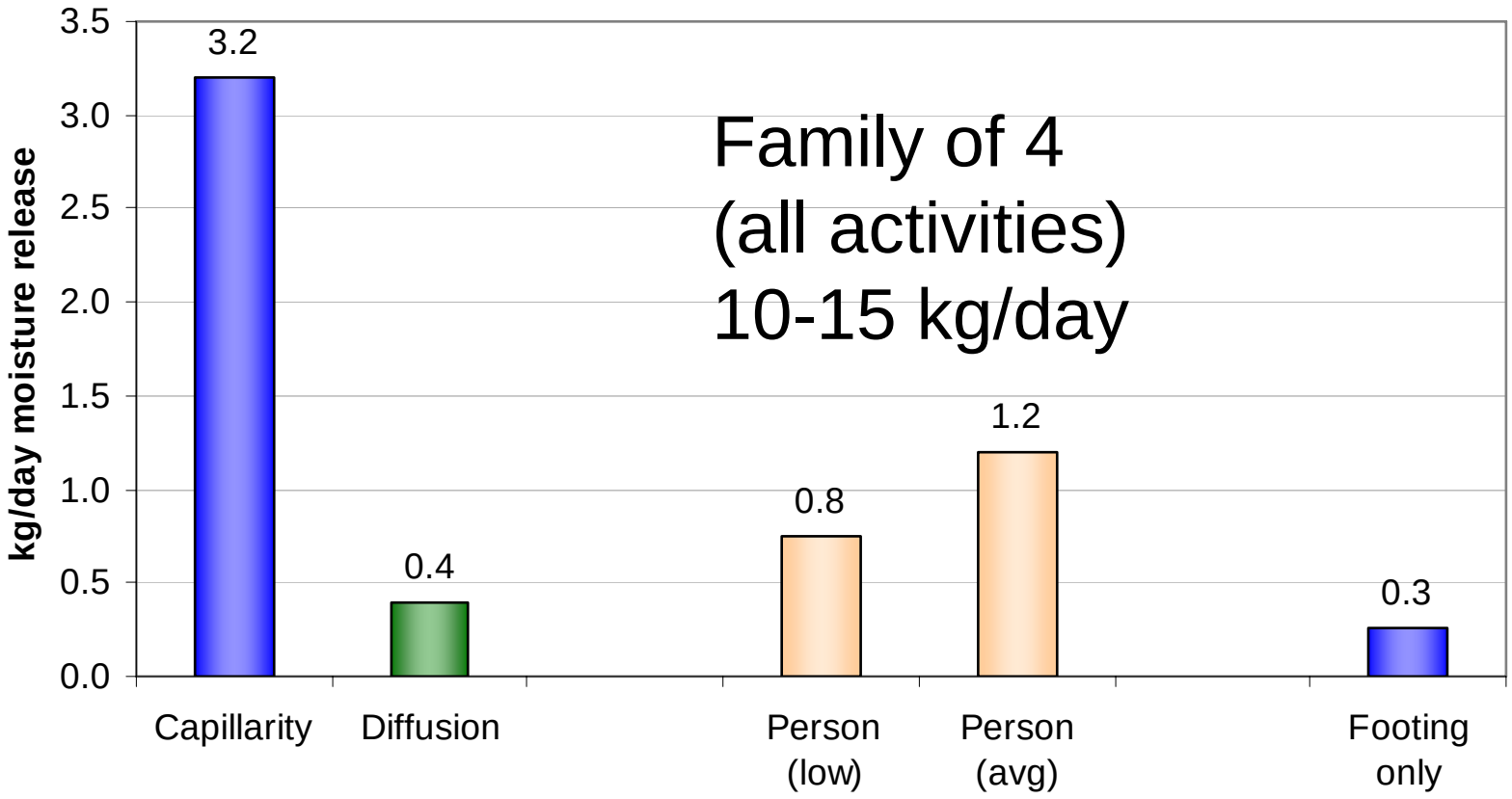


WUFI Results



Moisture Transport in Context

- 30’ x 40’ x 8’ tall basement (all surfaces—overpredicting of moisture flux)



Footing Capillary Breaks

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Material Choices

- Asphalt-based (standard dampproofings)
- Cementitious coatings (cement-based waterproofing, polymer modified)
- Can add acrylic polymer admixture if desired (greater durability?)
- Latex paint based waterproofing coatings
- Silanes & siloxanes

Membrane Material

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Conclusions

- Capillarity moisture flow through footings can contribute to interior insulation/finish failure
- Can do without capillary break at footing if appropriate/alternate assemblies are used
- But problem can be dealt with by providing capillary break

Questions & Discussion

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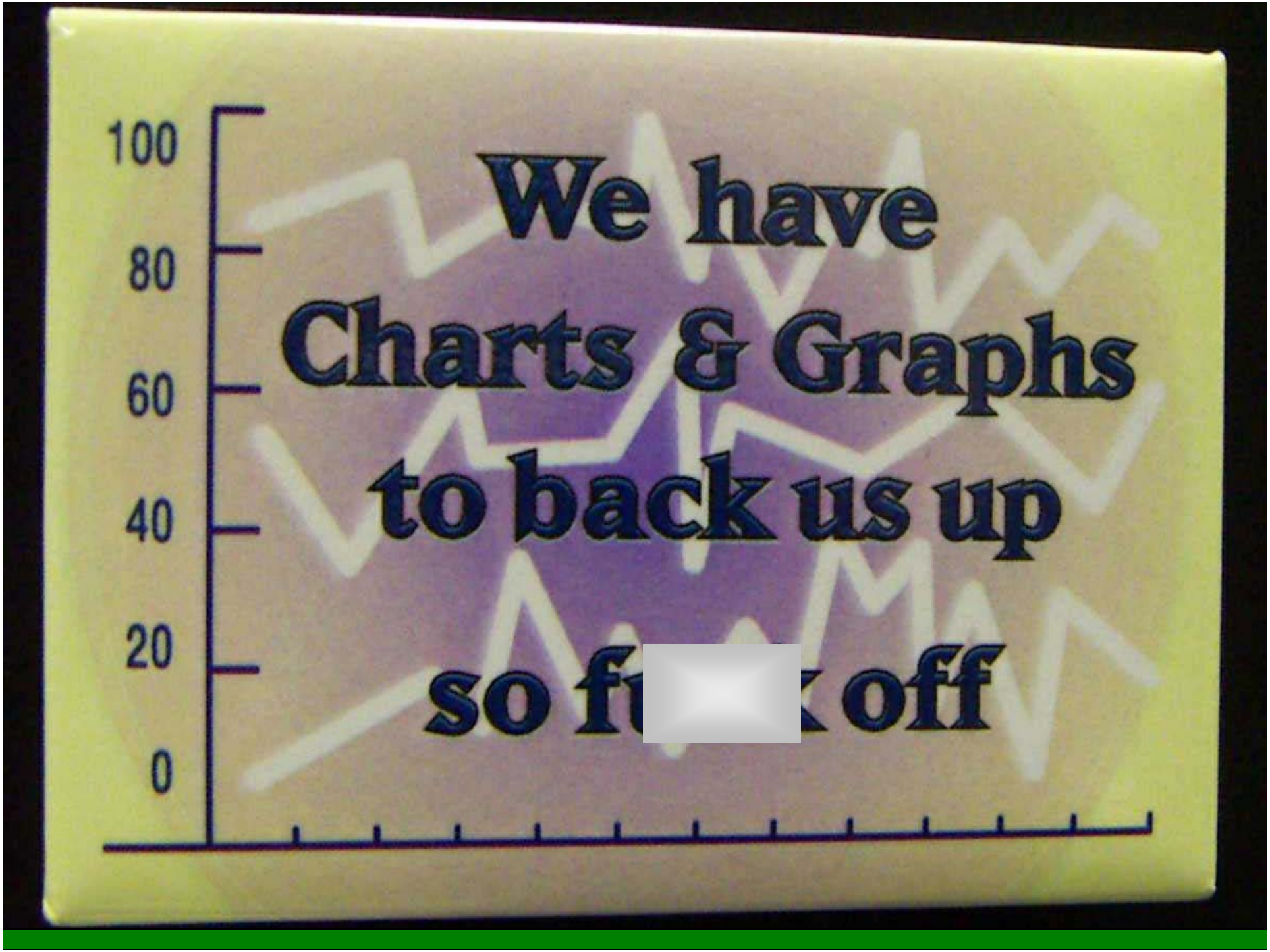
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We have
Charts & Graphs
to back us up
so f k off