Fire Test Comparisons

Ionization v. Photoelectric Detectors

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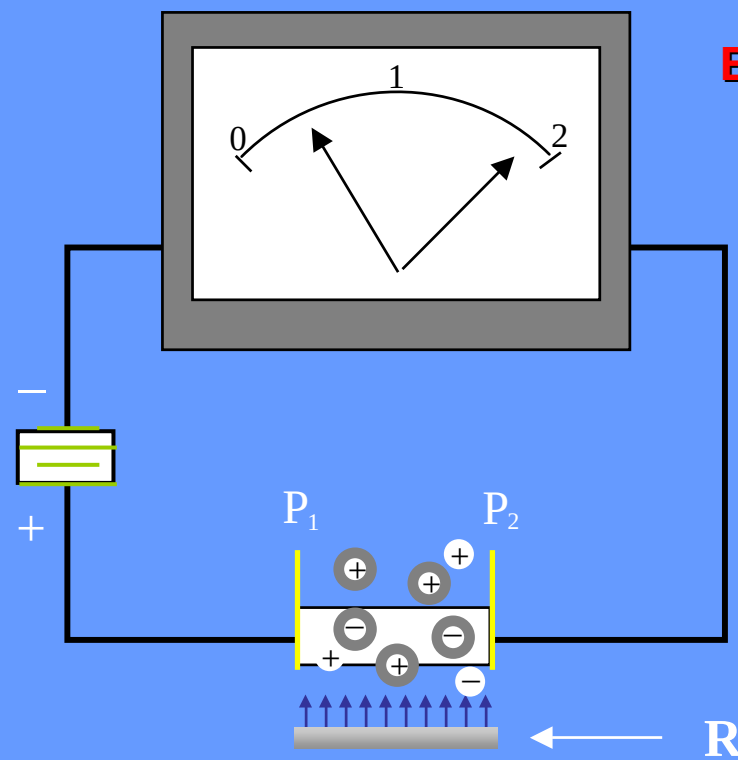
Agenda

- Technology Review
- Test Procedures
  - UL 268 Smoldering Fire
  - UL 268 Flaming Fire
  - TF5 Flaming Heptane
- Results

Detection Technology

Ionization Smoke Detection

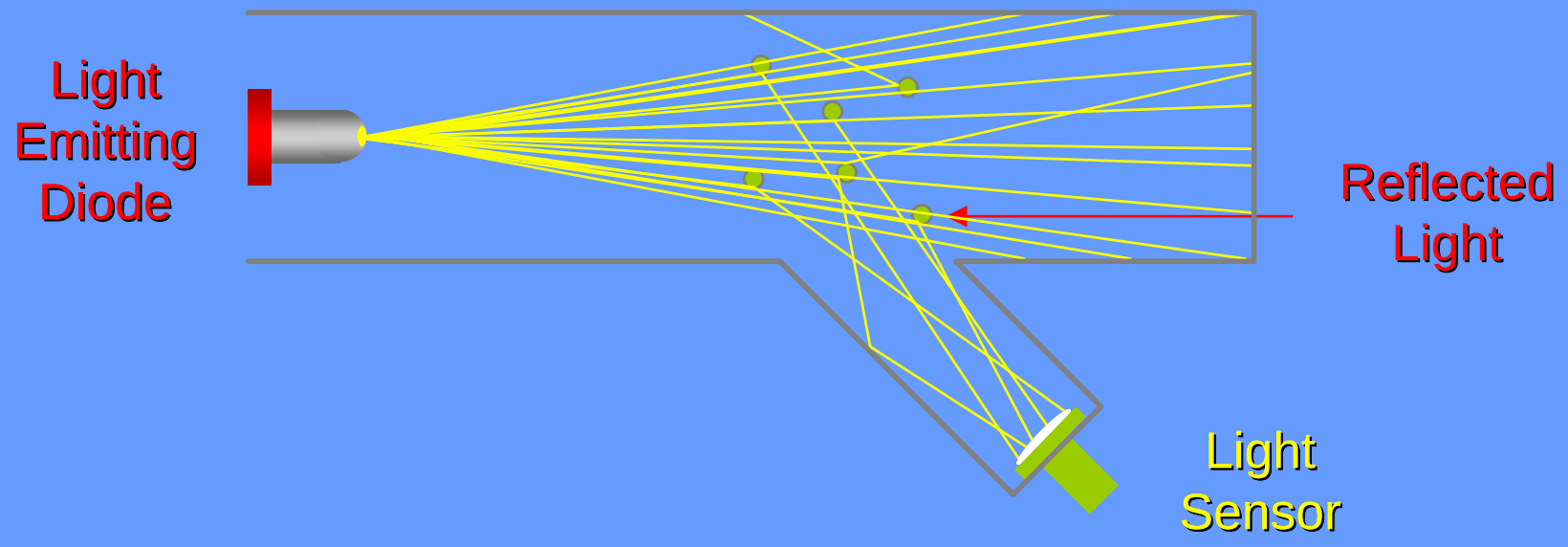


Electrical Current Changes With Smoke

Ionized Particles Enter the Sensing Chamber

Radioactive Material

Photoelectric Smoke Detector



Comparative Tests

Objective

Compare response-time characteristics.

Testing

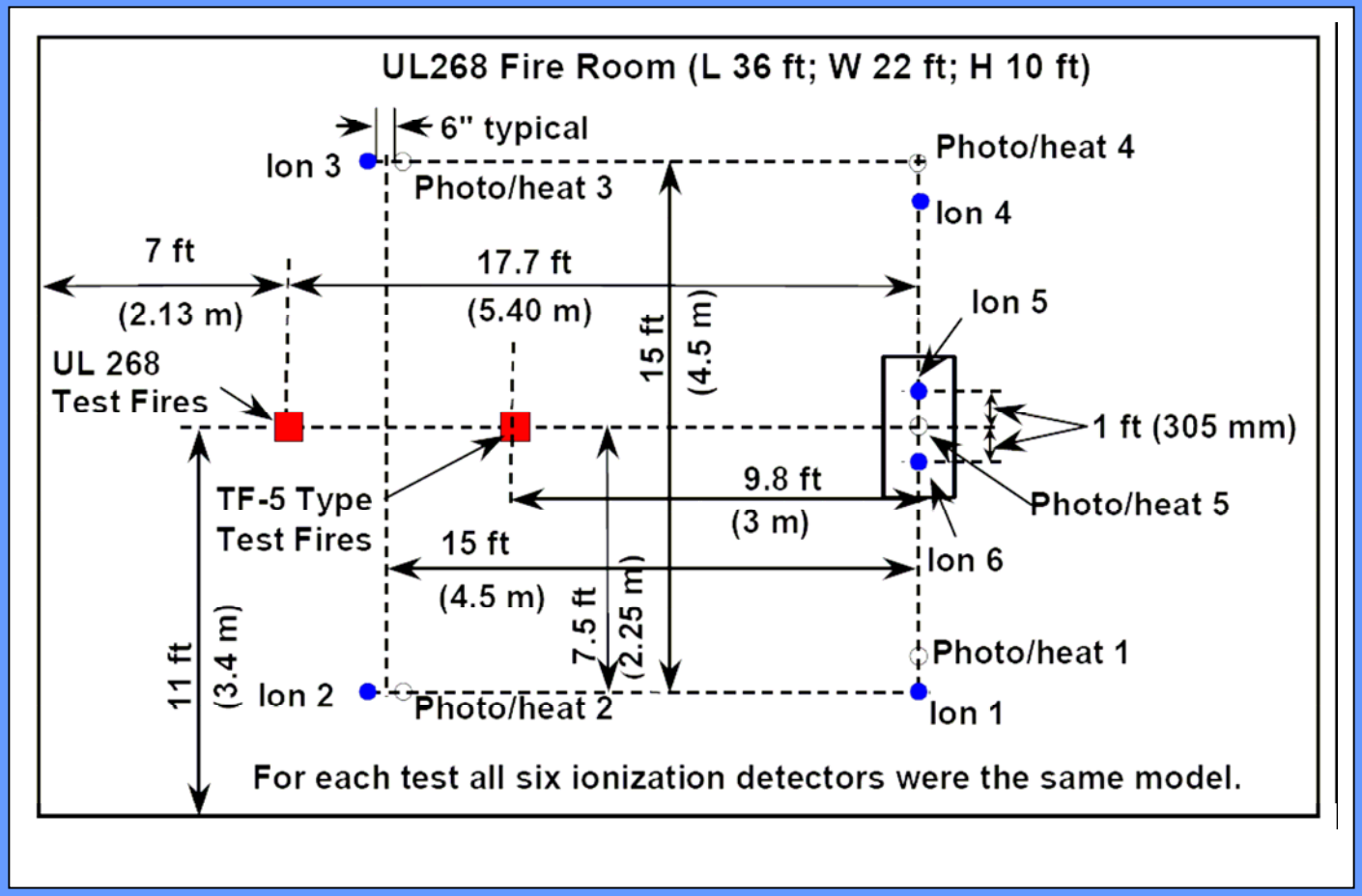
- Conducted by Simplex Time Recorder Co. / Tyco Electronic Product Group – Westminster, MA (2001)

- UL 268 Fire Test Room

Devices

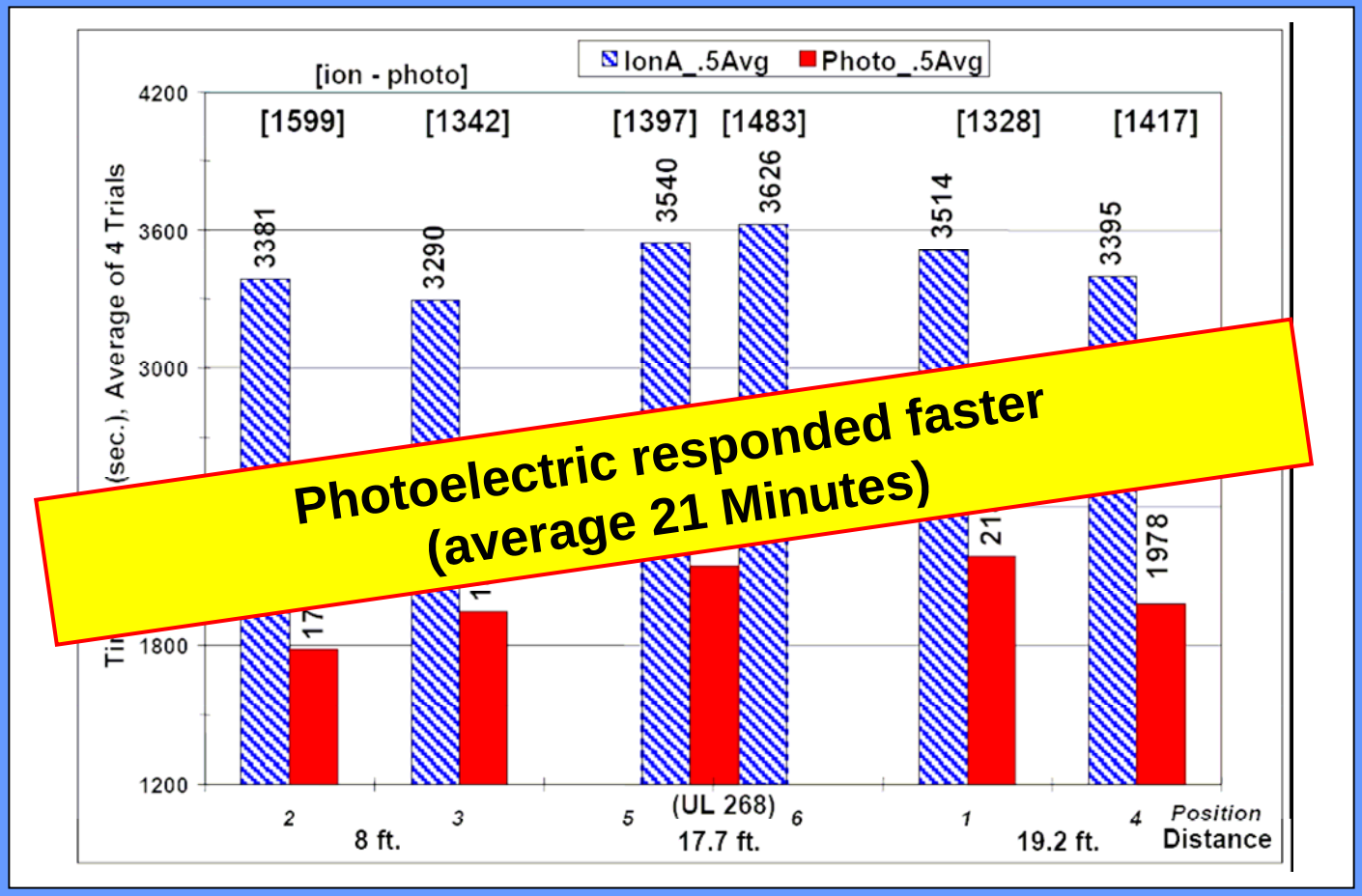
- Commercial detectors
  - Typical Photoelectric
  - Three different Ionization
- Representative of current technology
- Comparison tests
  - High sensitivity
  - Default sensitivity

Test Chamber



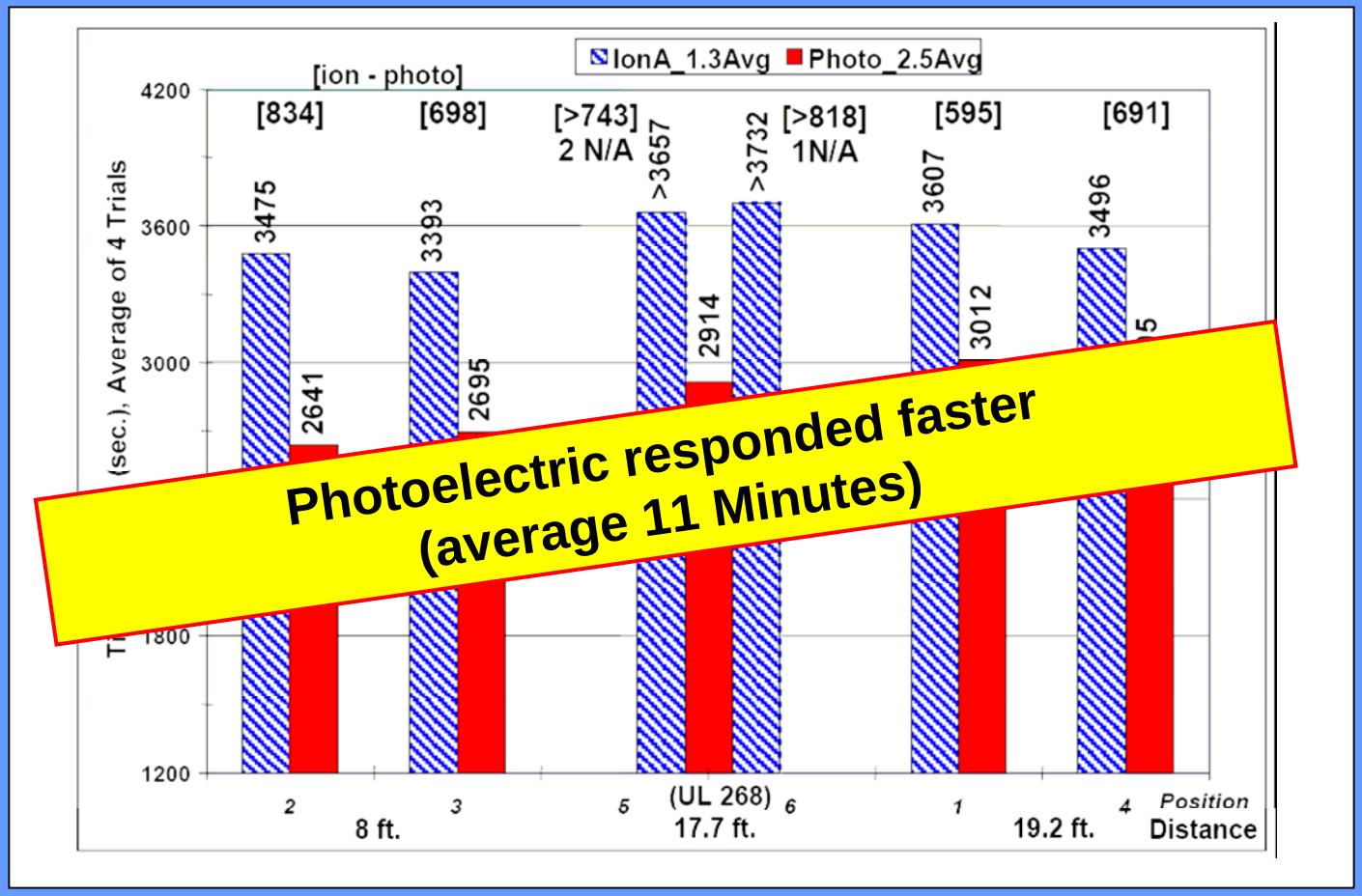
Smoldering Test

Smoldering Fire - High Sensitivity



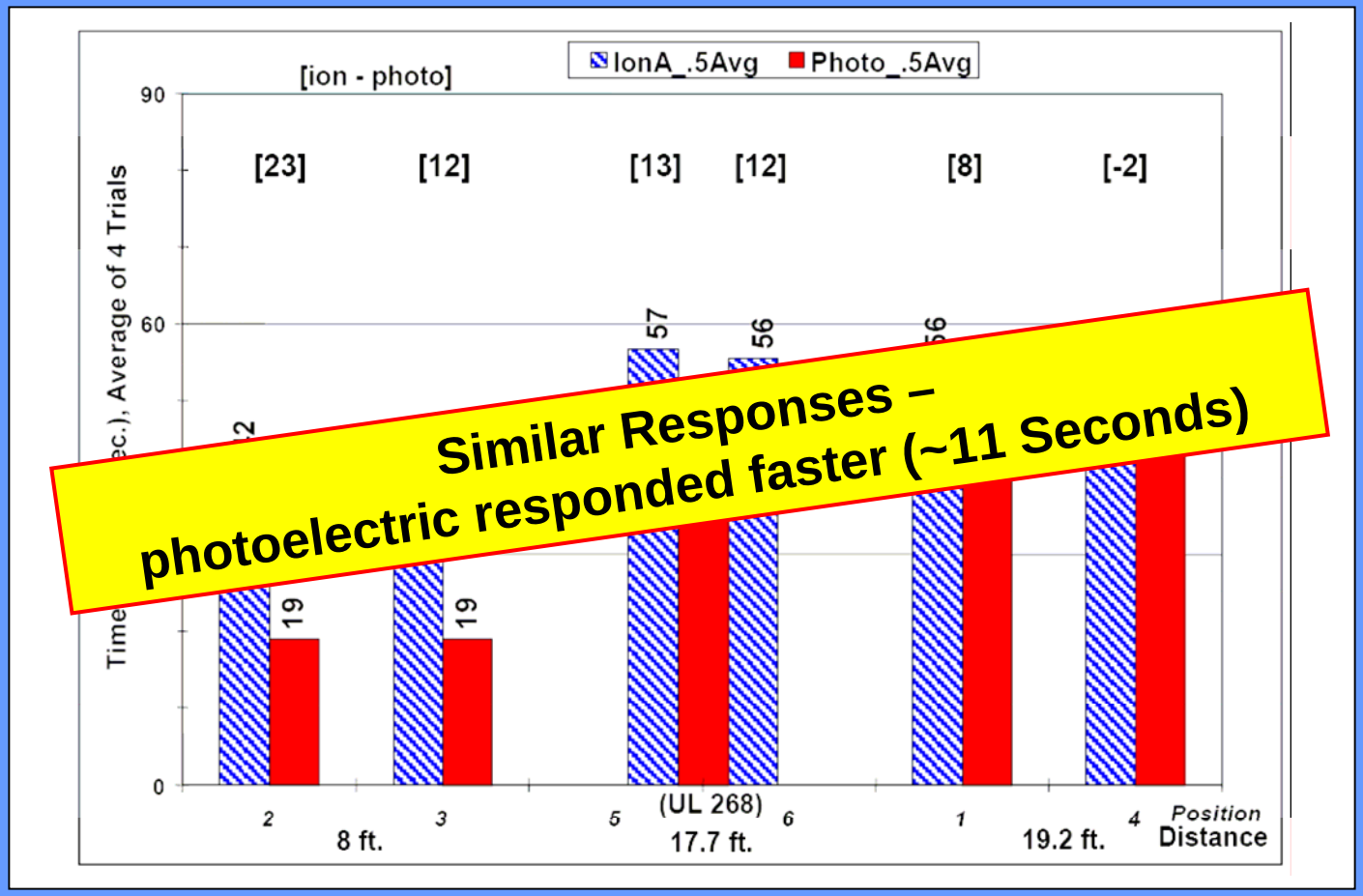
Photoelectric responded faster (average 21 Minutes)

Smoldering Fire – Normal Sensitivity

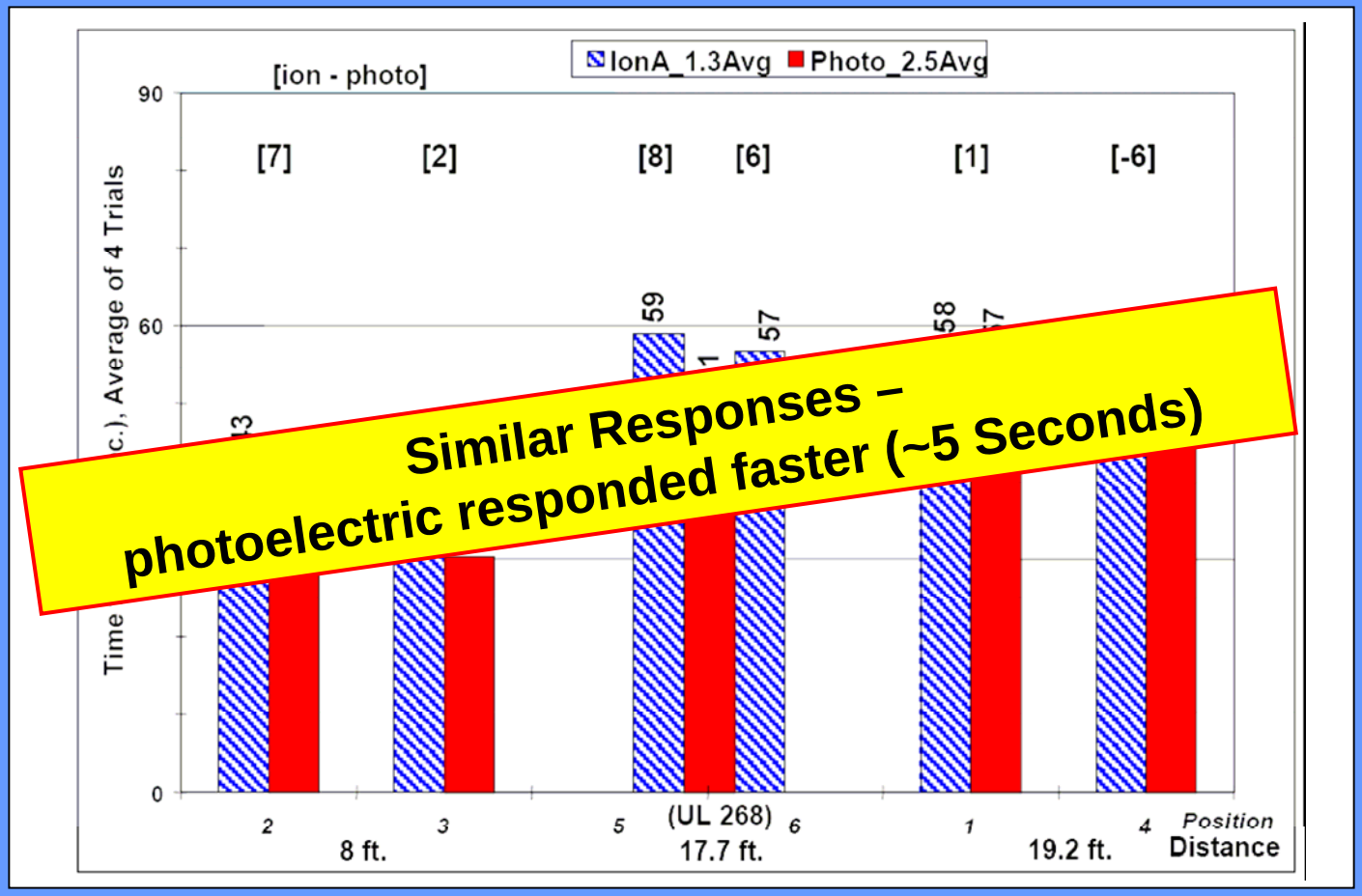


Flaming Test

Flaming Fire - High Sensitivity

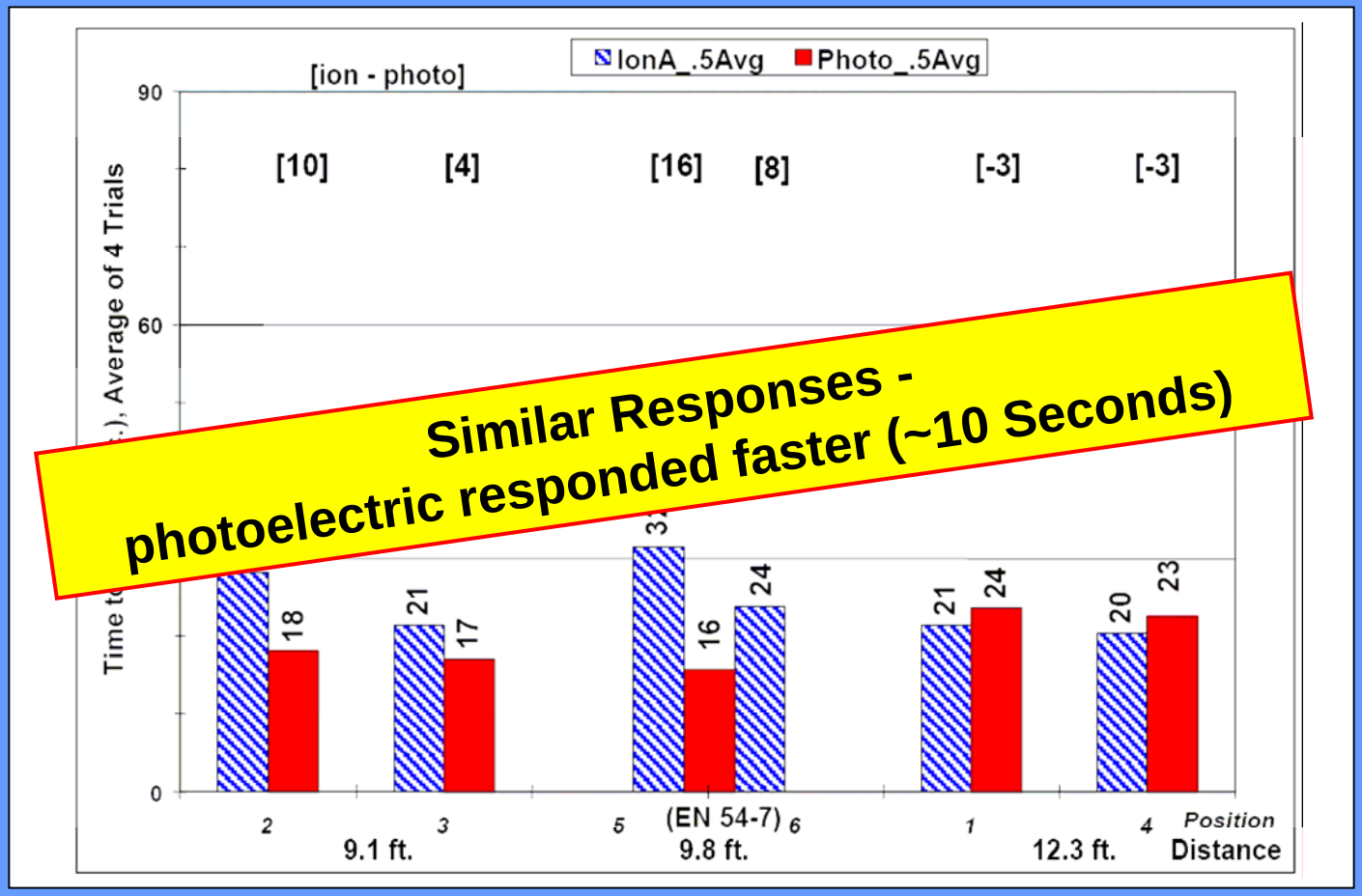


Flaming Fire - Normal Sensitivity



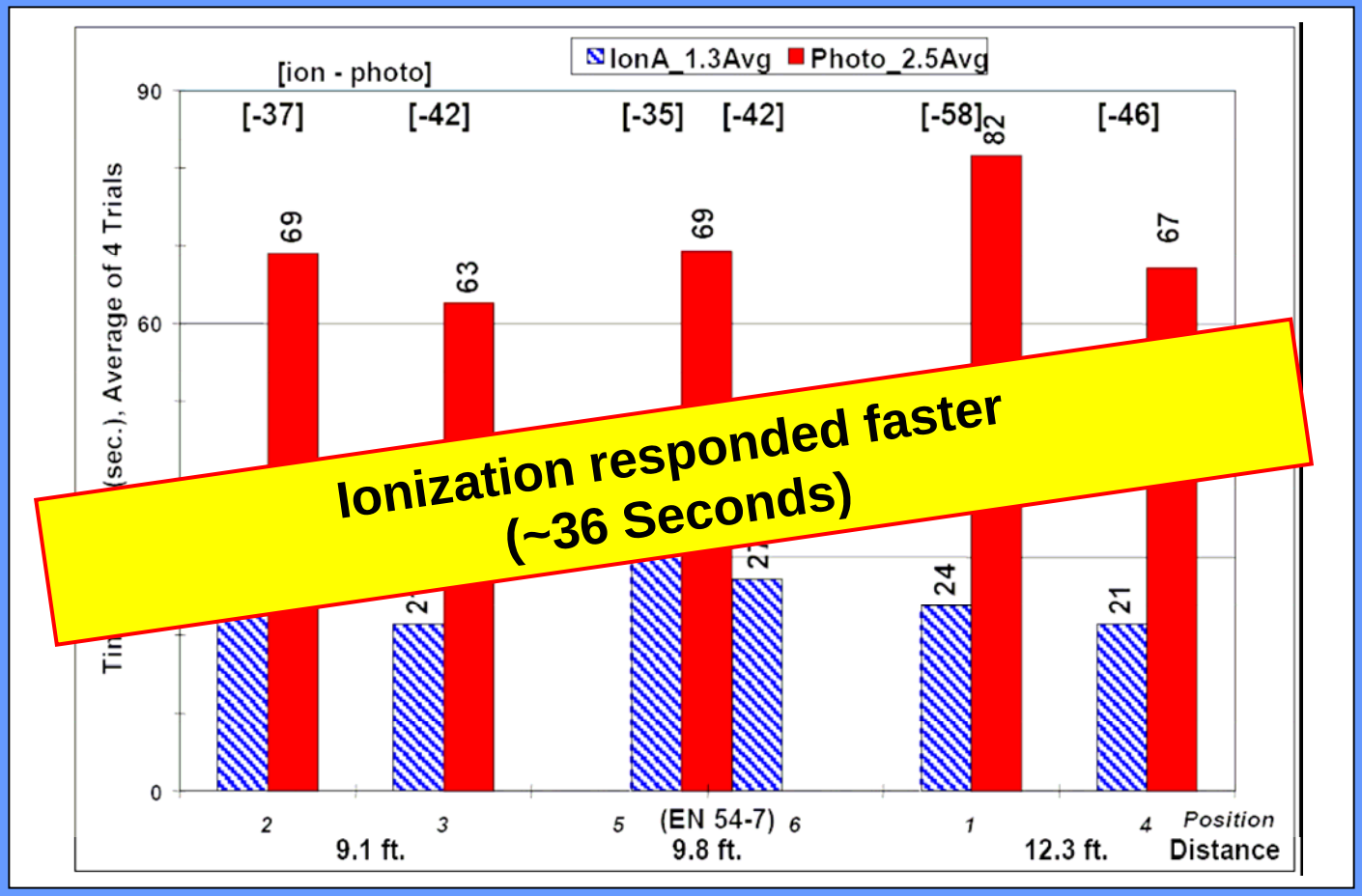
TF 5 Flaming Heptane

TF5 Heptane – High Sensitivity



Similar Responses - photoelectric responded faster (~10 Seconds)

TF5 Heptane – Normal Sensitivity



Ionization responded faster (~36 Seconds)

Summary

Smoldering Test

Photoelectric detectors responded significantly faster

Flaming Test

Detector responses were similar.

TF5 Heptane Results

Ionization and Photoelectric responses were similar.

At ‘normal’ sensitivity, Ionization responded 36 seconds faster.

Reference

- J. R. Qualey III, L. Desmarais, J. Pratt
  Simplex Time Recorder Co.

  Response-Time Comparisons of Ionization and Photoelectric/Heat Detectors (revised 3/28/01).