COMPARISON OF BEST-ESTIMATE

PLUS UNCERTAINTY AND

APPENDIX K LBLOCA ANALYSES

PRESENTATION TO USNRC
JUNE 28, 2000

MITCHELL NISSLEY
WESTINGHOUSE ELECTRIC COMPANY, LLC
(412) 374-4303

RECENT LOCA MARGIN EXPERIENCE

ON SEVERAL OCCASIONS WESTINGHOUSE HAS BEEN UNABLE TO DELIVER TARGETED PEAKING FACTORS USING APPENDIX K METHODS

FOR ONE OF THESE PLANTS, ANOTHER VENDOR PREVIOUSLY SUPPORTED PEAKING FACTORS OF FQ=2.5, FdH=1.67 USING APPENDIX K METHODS

- **WESTINGHOUSE NEEDS TO USE BEST-ESTIMATE PLUS UNCERTAINTY METHODS TO ACHIEVE SAME PEAKING FACTORS, ANALYSIS IN PROGRESS**

- **PREVIOUS BEST-ESTIMATE PLUS UNCERTAINTY ANALYSIS HAS BEEN PERFORMED FOR A SIMILAR PLANT WITH SIMILAR PEAKING FACTORS**

  - ⇨ **$PCT^{50\%}$ = 1562F, $PCT^{95\%}$ = 1892F**
  - ⇨ **ANALYSIS USING NRC-APPROVED BEST ESTIMATE METHOD GENERATED ABOUT 300F MARGIN WHEN UNCERTAINTIES WERE CONSIDERED**

RELAXED DECAY HEAT MODEL WORTH ABOUT 250-450F IN BASH EM, RELAXED METAL-WATER MODEL WORTH ABOUT 50F

OBSERVATIONS REGARDING THE "PLUS UNCERTAINTIES" REQUIREMENT

"BEST-ESTIMATE" CALCULATIONS PERFORMED IN THE 1980s FREQUENTLY USED ASSUMPTIONS NOT ALLOWED FOR DESIGN BASIS CALCULATIONS, e.g.

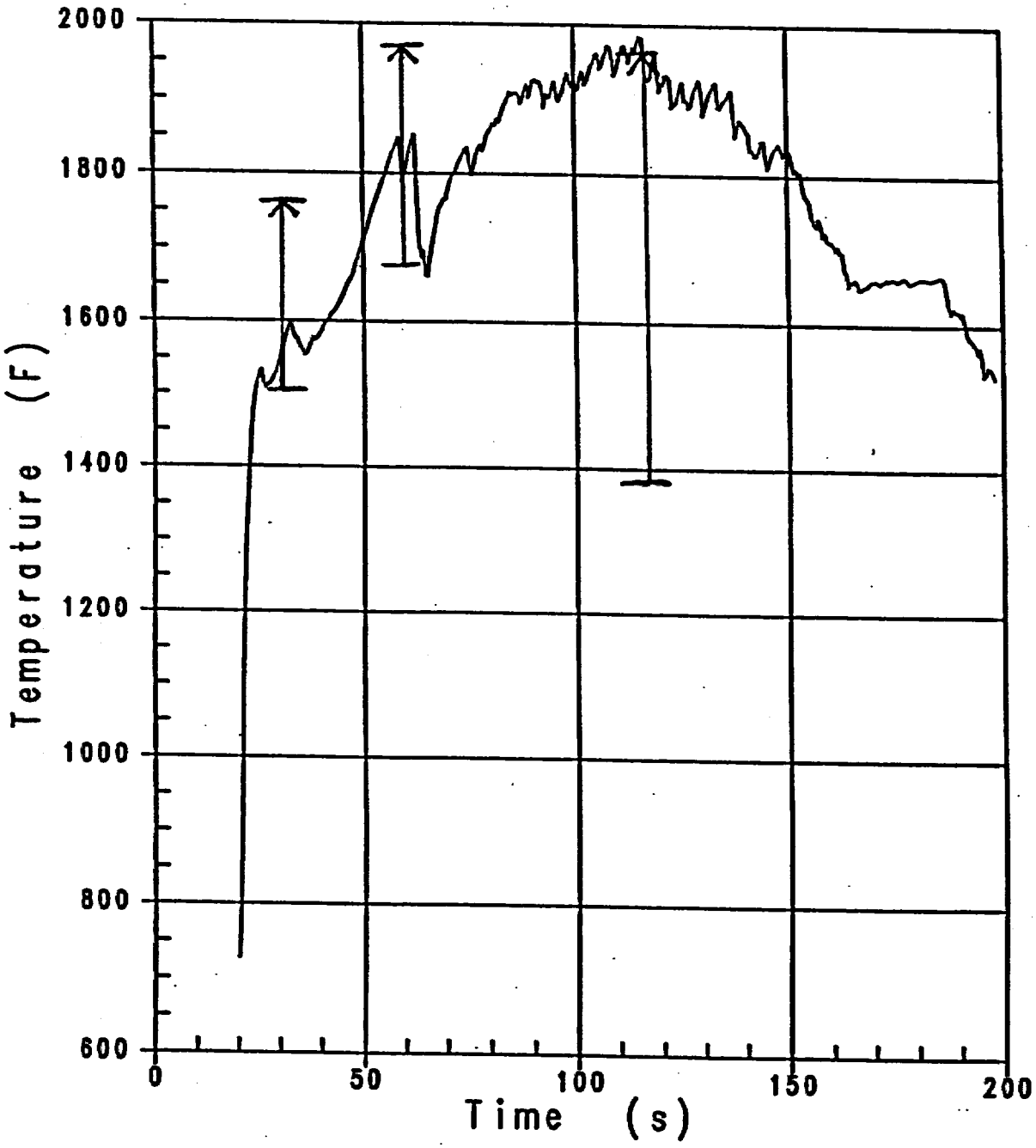
- **NO SINGLE FAILURE**
- **PEAKING FACTORS UNDER BASELOAD CONDITIONS**
- **NO TREATMENT OF UNCERTAINTIES**

⇨ **PEAK CLADDING TEMPERATURES WERE QUITE LOW (~1000F)**

CSAU DEMONSTRATION ANALYSIS CONTINUED THIS PRACTICE TO SOME EXTENT (e.g., FQ = 1.68), BUT DID ADDRESS UNCERTAINTIES (NUREG/CR-5249)

BLOWDOWN: $PCT^{50\%}$ = 1162F, $PCT^{95\%}$ = 1447F (Δ = 285F)
EARLY REFLOOD: $PCT^{50\%}$ = 978F, $PCT^{95\%}$ = 1399F (Δ = 421F)
LATE REFLOOD: $PCT^{50\%}$ = 758F, $PCT^{95\%}$ = 1336F (Δ = 578F)

REVIEW OF W BEST ESTIMATE PLUS UNCERTAINTY ANALYSES TO DATE INDICATE DIFFERENCES OF 300-600F BETWEEN $PCT^{50\%}$ & $PCT^{95\%}$ IN REFLOOD



50TH AND 95TH PERCENTILE PEAK CLADDING TEMPERATURES - BLOWDOWN, EARLY REFLOOD AND LATE REFLOOD

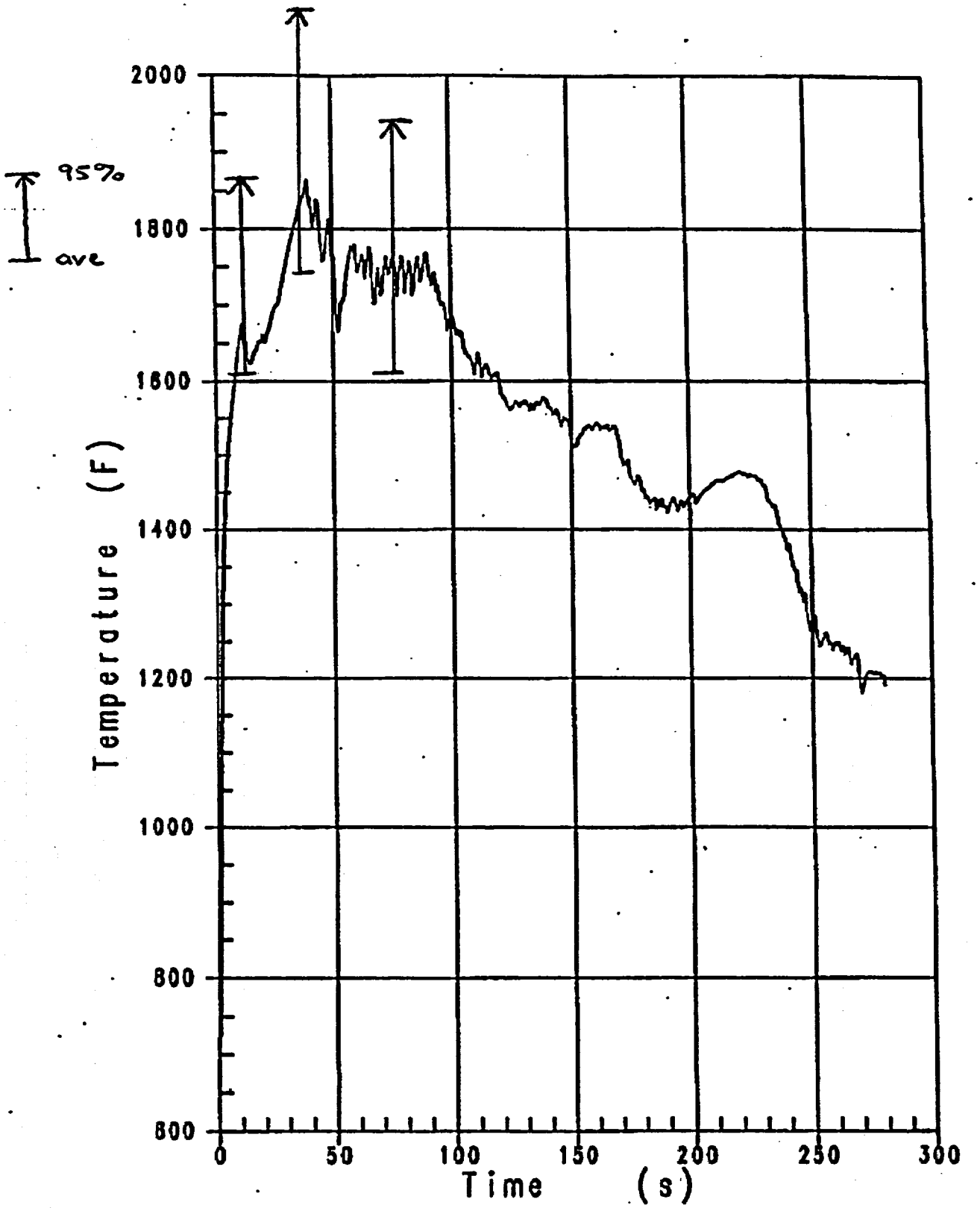


Figure 5-3-1. Peak Cladding Temperature for Reference Transient

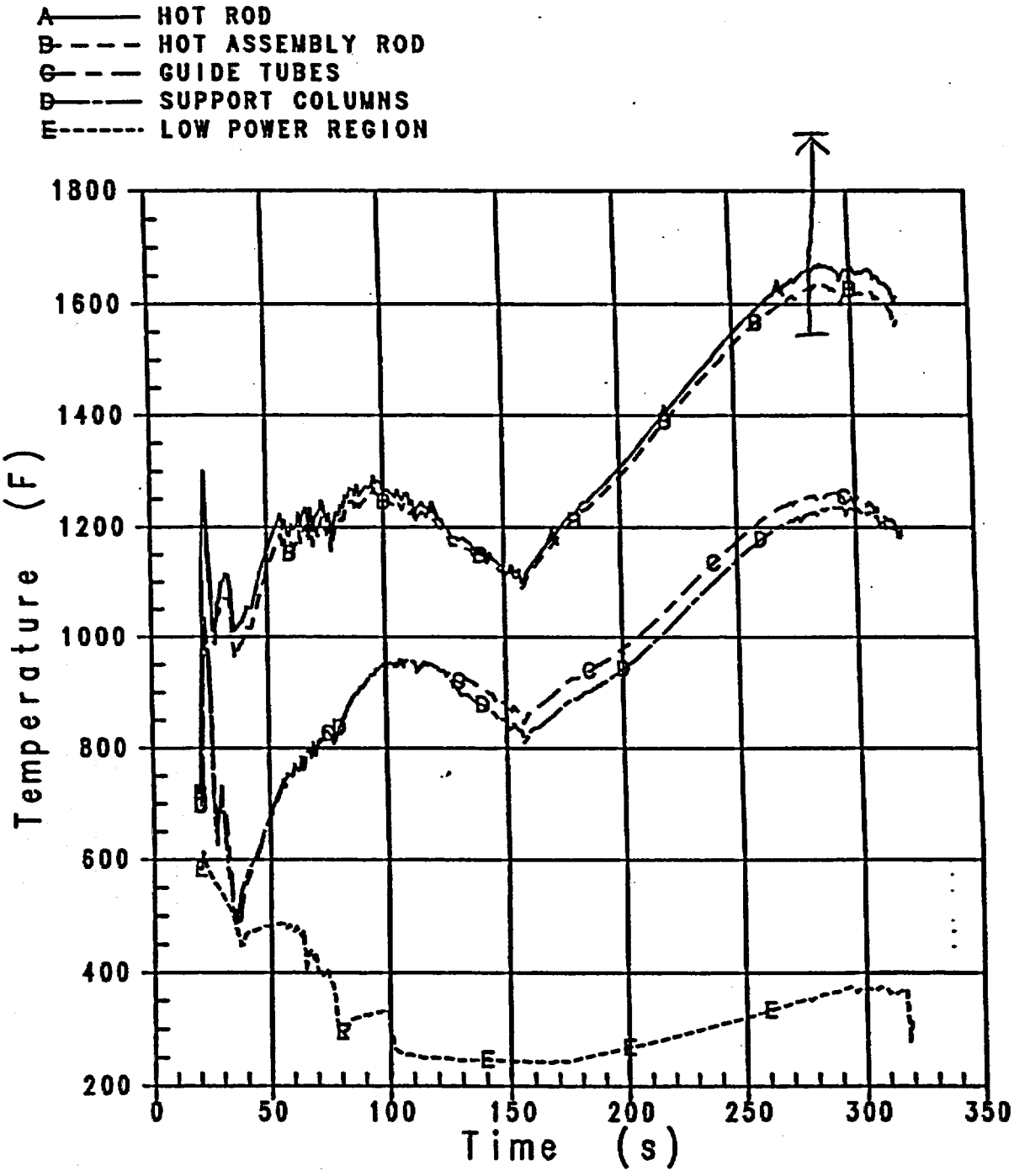


Figure 4-3-15. Peak Cladding Temperature Comparison for Five Rods for Initial Transient