NON-PROPRIETARY SLIDES

GE PRESENTATION TO NRC

JUNE 10, 1983

BETHESDA, MARYLAND

GENERAL ELECTRIC/NRC MEETING

SAFER APPROVAL

JUNE 10, 1983
BETHESDA, MARYLAND

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION
SAN JOSE, CALIFORNIA

MEETING AGENDA

□ INTRODUCTION	D.K. Dennison
□ RESPONSES TO NRC QUESTIONS ON APPLICATION	B.S. Shiralkar
□ MODEL CLOSURE	B.S. Shiralkar
□ CONCLUSION	D.K. Dennison

MEETING OBJECTIVES

- RESPOND TO NRC QUESTIONS ON APPLICATION APPROACH

- UPDATE AND CLOSE OUT MODEL REVIEW

- AGREE ON CLOSURE SCHEDULE FOR SAFER/GESTR APPROVAL

SAFER ACTIVITIES

- ☐ MODEL LTR SUBMITTED TO NRC (12/81)
- ☐ TLTA QUALIFICATION RESULTS PRESENTED TO NRC (8/82)
- ☐ SAFER OVERVIEW PRESENTED TO ACRS (12/82)
- ☐ QUALIFICATION AND APPLICATION RESULTS PRESENTED TO NRC (1/83)
- ☐ SAFER DETAILS PRESENTED TO ACRS (2/83)

  ACRS Suggested:

  - Monte Carlo Analysis
  - Multiple Channel Modeling

- ☐ NRC REQUESTED MODIFICATIONS TO APPLICATION APPROACH (3/83)
- ☐ NEW APPLICATION METHODOLOGY DEVELOPED (4/83)
- ☐ NRC AND GE PRESENTED APPLICATION METHODOLOGY TO ACRS (5/83)

NEED CLOSURE

PROPOSED SCHEDULE

□	PRESENT ANSWERS TO APPLICATION QUESTIONS (GE)	6/10/83
□	SUBMIT FIRST SET APPLICATION APPROACH DOCUMENTATION (GE)	6/17/83
□	ISSUE SAFER MODEL SER (NRC) (GESTR EXPECTED 6/15/83)	6/30/83
□	SUBMIT FINAL SET APPLICATION APPROACH DOCUMENTATION (GE)	7/15/83
□	ISSUE SAFER/GESTR APPLICATION SUPPLEMENT TO SER (NRC)	8/15/83

NEED CONFIRMATION
OF THIS SCHEDULE

SAFER DOCUMENTATION

- ☐ MODEL DESCRIPTION (Ref. 1) — 12/30/81

- ☐ SUBMITTAL LETTER (Ref. 2) — 1/28/83
  - SAFER/GESTR Application Methodology
  - SAFER Qualification With TLTA Tests
  - Responses to NRC Questions (Round 3)
  -

- ☐ SUBMITTAL LETTER (Ref. 3) — 1/28/83
  - TRACB02 Qualification

- ☐ SUBMITTAL LETTER (Ref. 4) — 2/16/83
  - SAFER Application Study - Typical Break Spectrum Results
  - Side Entry Orifice CCFL Tests

- ☐ PLANNED SUBMITTAL #1 (Today's Topics) — 6/17/83
  - Model Update
  - Responses to NRC Application Questions (1st Batch)
  - Proprie

- ☐ PLANNED SUBMITTAL #2 — 7/15/83
  - Responses to Application Questions (Final Batch)
  - Amended Application Methodology
  - Amended Break Spectrum Results

DOCUMENTATION REFERENCES

1. K.C. Chan, et al, "The GESTR-LOCA and SAFER Models For the Evaluation of the Loss-of-Coolant Accident" NEDE-23785-1-P, Volume II, December 1981

2. Letter From H.C. Pfefferlen (GE) to Brian Sheron (NRC), "Transmittal of General Electric Documents on the Subject of SAFER Qualification and Application Results (Proprietary)" January 28, 1983

3. Letter From H.C. Pfefferlen (GE) to Brian Sheron (NRC), "Transmittal of General Electric Documents on the Subject of SAFER Qualification and Application Results (Non-Proprietary)," January 28, 1983

4. Letter From H.C. Pfefferlen (GE) to Brian Sheron (NRC), "Submittal of Documentation on SAFER/GESTR Break Spectrum Results and CCFL Modeling," February 16, 1983

TRACB02 QUALIFICATION STUDIES

I. Developmental Assessment

Model	Data
Void Fraction (Steady State)	FRIGG Bundle Data
Subcooled Voids	Christensen data
Critical Flow	Vessel Blowdown, Edwards Test
Level (Transient void fraction)	Vessel Blowdown
CCFL	Single Bundle CCFL test
Interfacial Heat Transfer	ORNL film boiling tests
Boiling Transition	TLTA
	ORNL film boiling
Jet Pump	1/6 scale INEL data
	Full scale BWR jet pump data
Steam Separator	Full scale BWR Steady State performance data
Upper Plenum	Horizontal Spray Test, 16° Sector Mixing Test

II. Independent Assessment

Facility and Assessment Objective

- O Vessel Blowdown
  - Flashing/Level Swell
  - Void Distribution

- O Oak Ridge Single Bundle Test
  - Film Boiling (Measured Rod Temp Approx. 1500°F)

- O TLTA ~~Local~~ LOCA Tests
  - Overall System Response (Key Phenomena, Sequence of Events)
  - Critical Flow
  - CCFL/CCFL Breakdown
  - Hydraulics in a "complex" pool (e.g., Lower Plenum)
  - Jet Pump Performance
  - Bundle Thermal Response
    Boiling Transition/Rewet
    Temperature & Heat Rate (Flow/Heat Transfer Regime)

- O SSTF (3D-Effects)
  - ECC Mixing in Upper Plenum
    Subcooling Distribution (Upper Plenum Inventory)
  - Multiple Bundle CCFL
    Parallel Channel Hydraulics

Estimate of TRAC-BWR Extrapolation Errors

- Nodalization
  - Sensitivity studies
- Scale
  - Large scale predictions
- Overall estimate

  Bias: $\sim$ - 50°F

  Range: $\pm$ 100°F

NODALIZATION

- Primary impact on 1st peak due to core flow decay (jet pump reverse flow)
  - Small sensitivity ~20°F
- Primary impact on 2nd peak due to number of bundles in high power region
  - Conservative bias of ~50°F.

Figure A.1 Sensitivity to Jet Pump Losses (BWR/6 DBA)

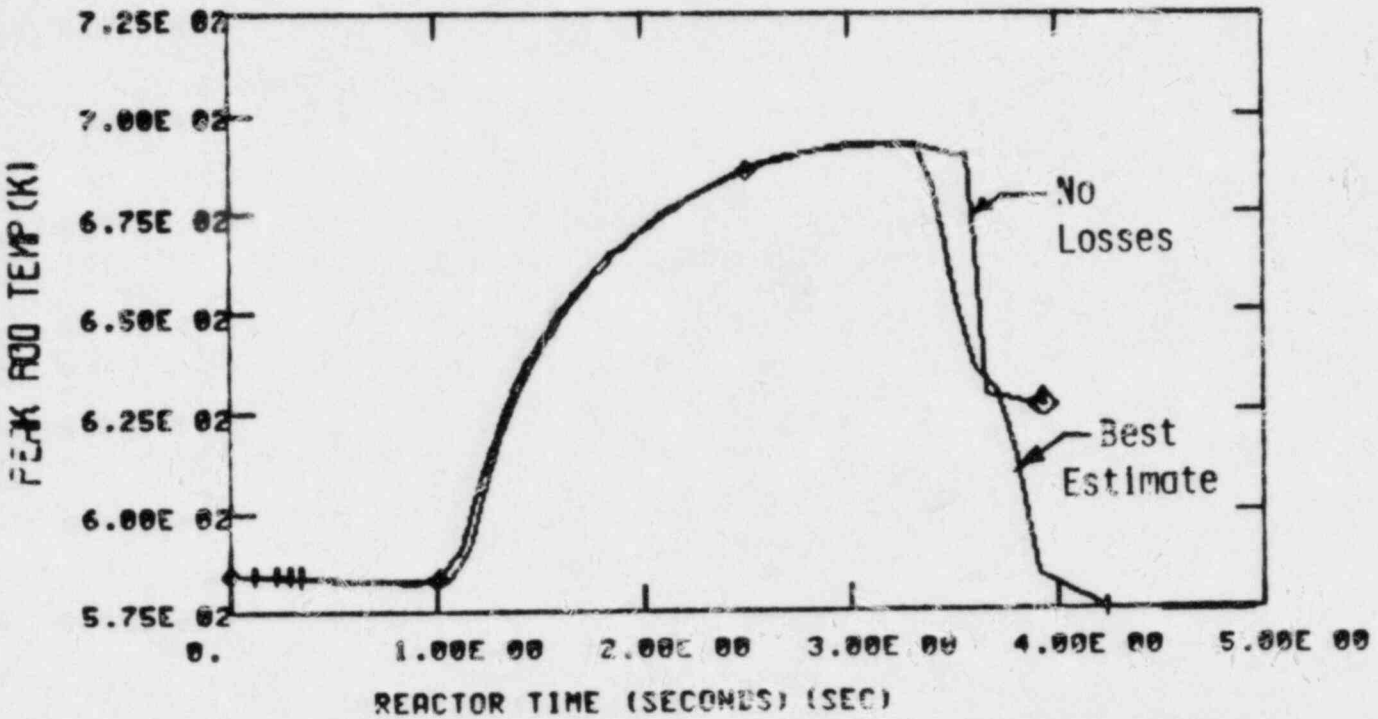


Figure A.3: TRAC Prediction
of SSTF Core ΔP

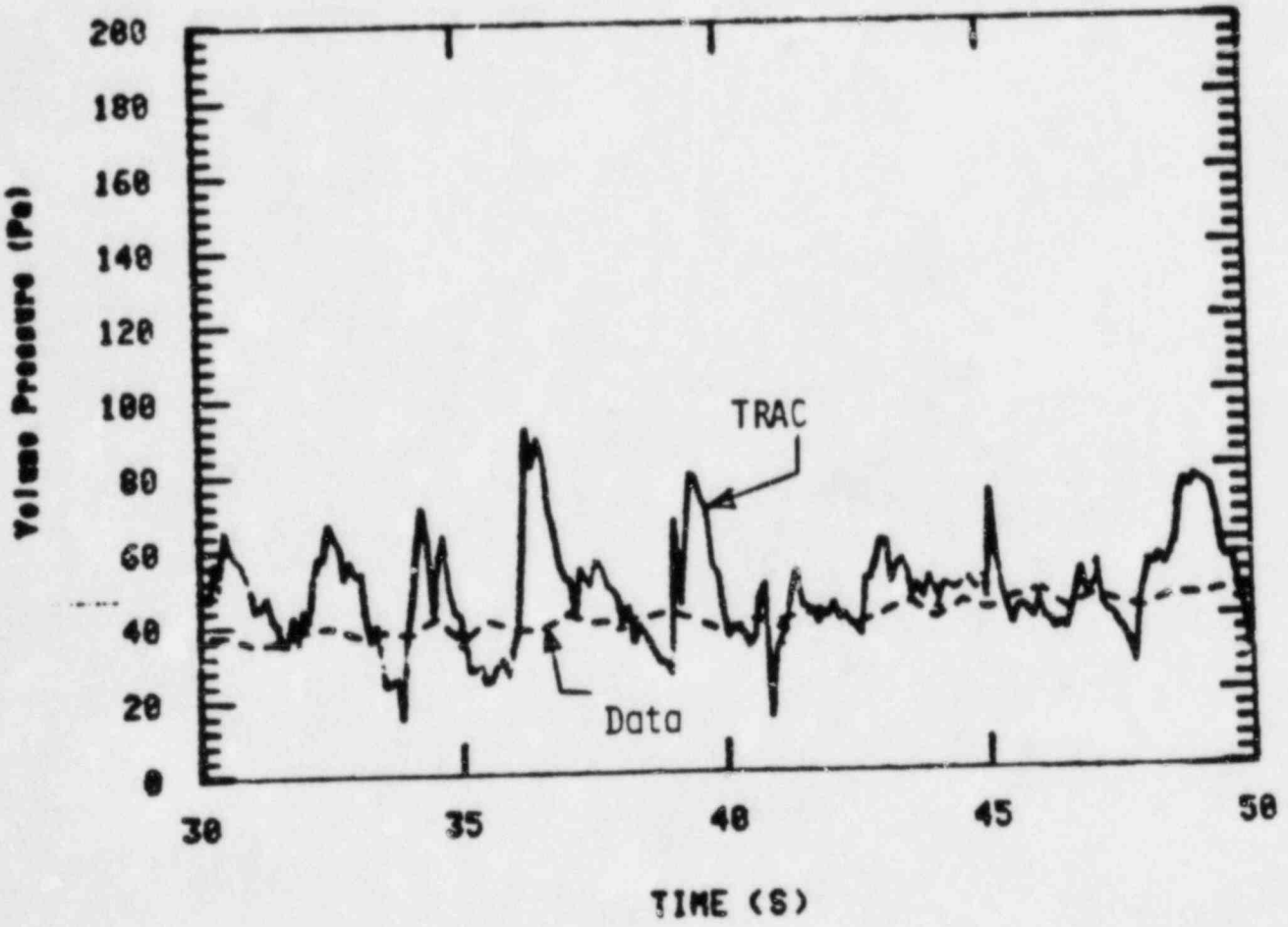
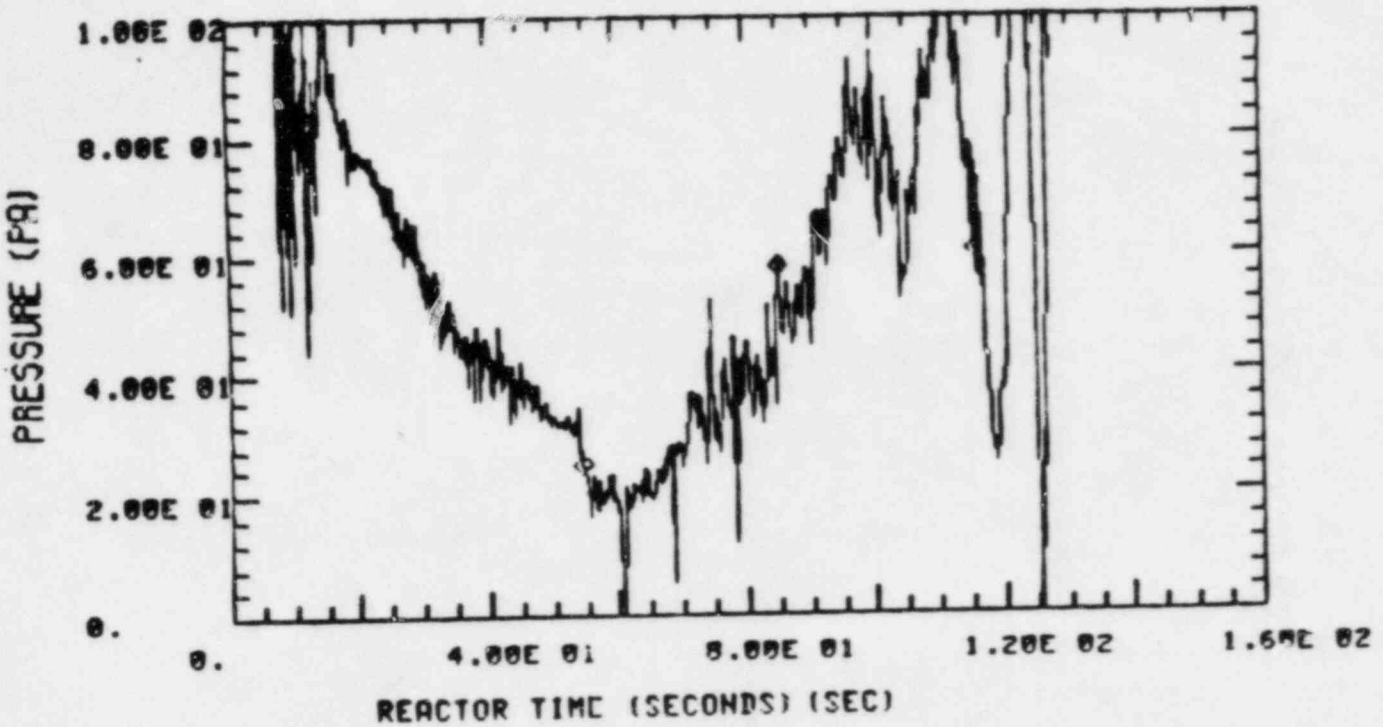


Figure A.4: TRAC Prediction of Core ΔP
for BWR/6 DBA

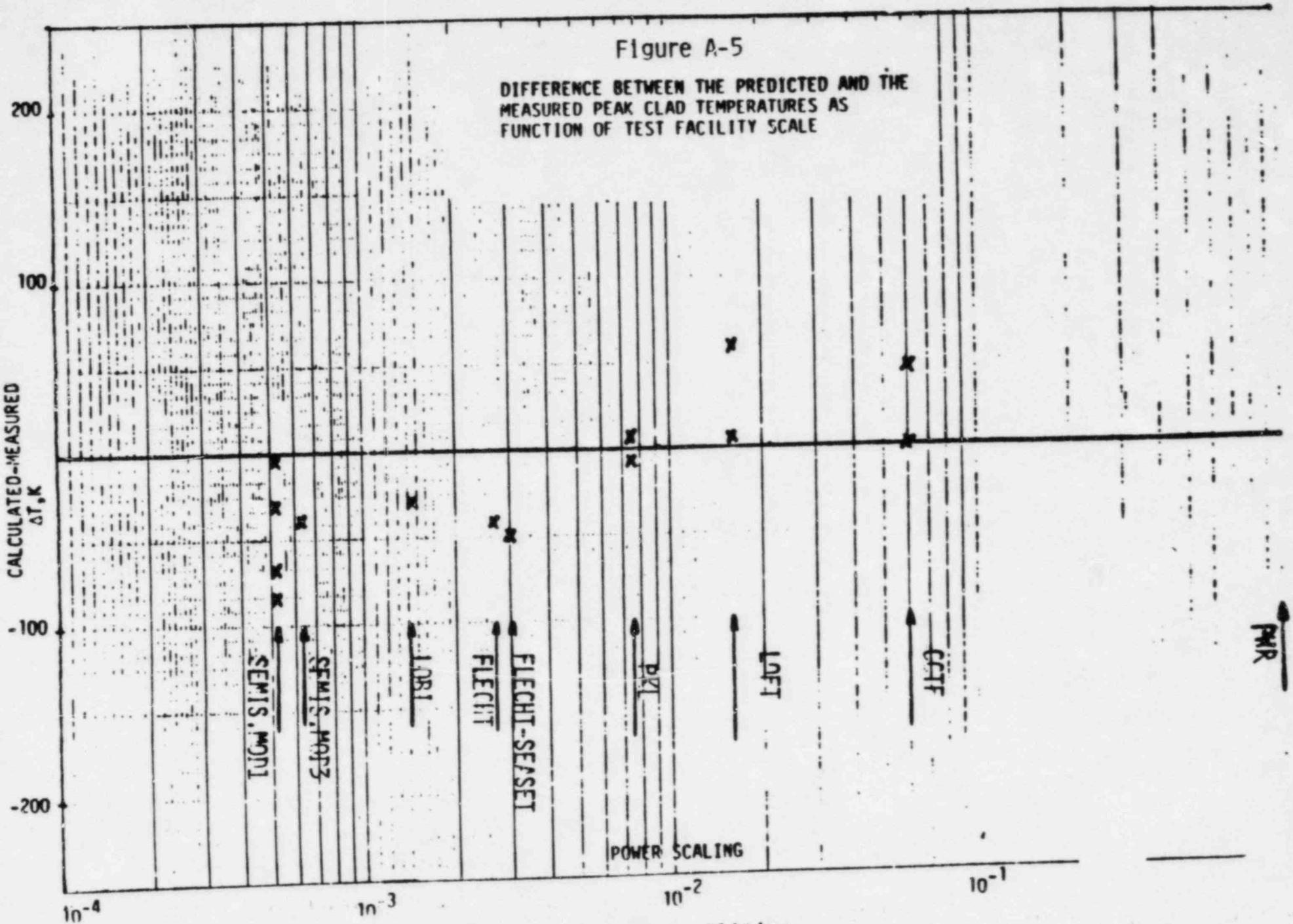


SCALE

- Primary concern is new phenomena in large scale facilities.
- Full scale system refill hydraulics tests (SSTF) qualify TRAC predictions
- BWR Heat transfer characterized by single bundle experiments
- Uncertainty extrapolation to large scale effects judged to be less than 100°F.

Figure A-5

DIFFERENCE BETWEEN THE PREDICTED AND THE MEASURED PEAK CLAD TEMPERATURES AS FUNCTION OF TEST FACILITY SCALE



TRAC-PD2 Vs. PWR Facilities