

# ACCELERATOR READINESS WORKSHOP

**James R. Boyce**



*The Continuous Electron Beam Accelerator Facility*

jrb[ARR-3]ARR Workshop 11/93

November 1, 1993

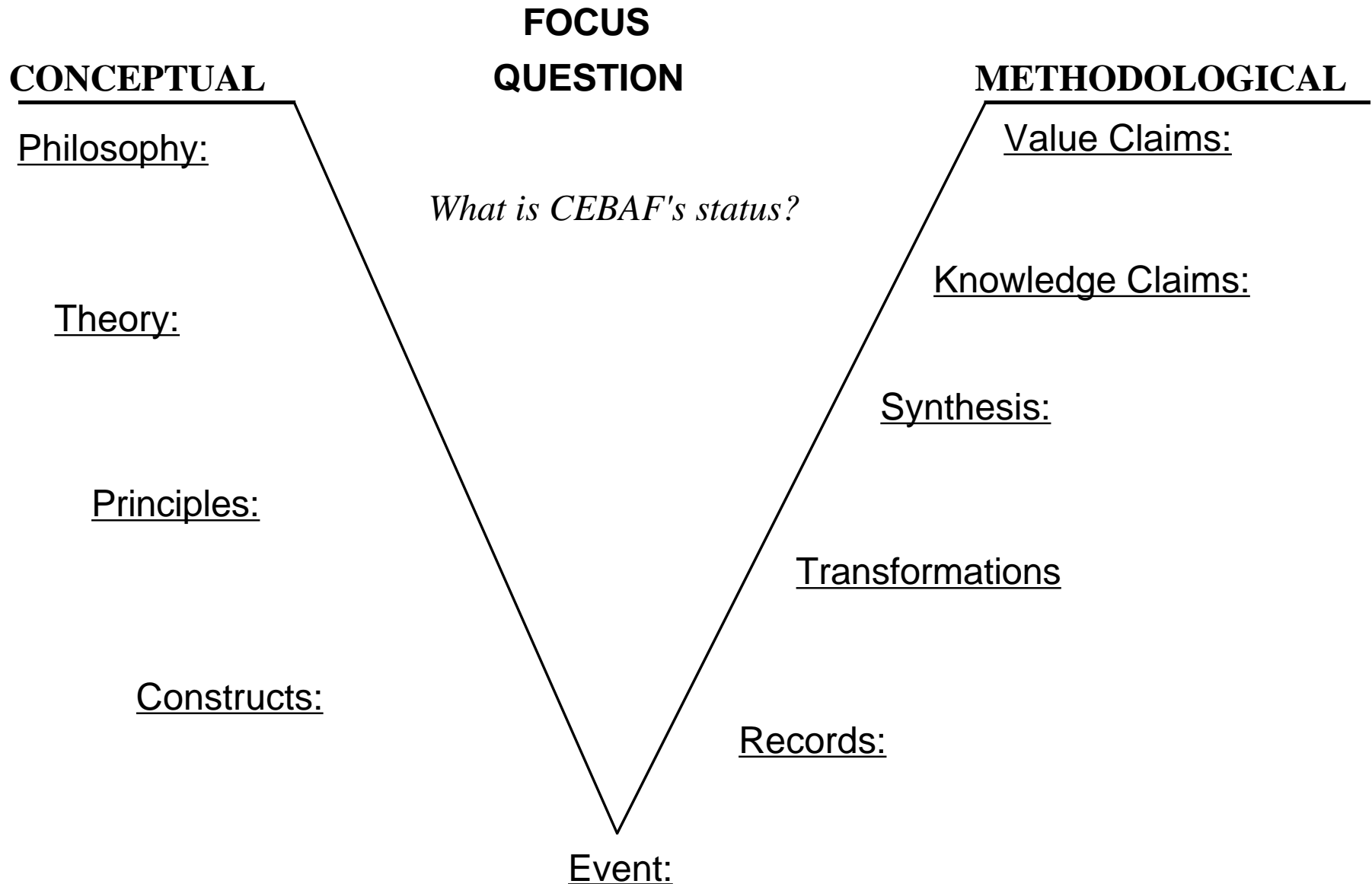
**Q:       How do we know we are ready to go to the next step?**

**A1:      Faith and trust**

**A2:      The “Readiness” Process**

**Q:       What is “Readiness”?**

**A:       A systematic process that this workshop will explain**



## FOCUS QUESTION

What is CEBAF's status?

### CONCEPTUAL

#### Philosophy:

Systematic assessment of facility will reveal readiness status.

#### Theory:

- Self assessment by knowledgeable experts.
- Independent peer review by knowledgeable professionals.

#### Principles:

- Readiness Tree (Concept Map) reveals structure.
- Criteria development that is site specific.
- Tracking development.

#### Constructs:

- "In the field" observations
- Recording of assessment activities
- Identification of "Issues" and "Concerns"

#### Event:

Perform Self-Assessment  
in the field.

### METHODOLOGICAL

#### Value Claims:

CEBAF is:

- Safe
- Needed
- Economic

#### Knowledge Claims:

- CEBAF Readiness Status
- Validity of Readiness Process

#### Synthesis:

- Conduct Independent Peer Review
- Validate Readiness Status
- Generate Final Report to SURA & DOE

#### Transformations

- Summarize Issues, Concerns, & other info.
- Develop Action Plans

#### Records:

- Completed assessment forms
- Notes and impressions of participants
- Minutes of meetings

**CEBAF**

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# ACCELERATOR READINESS PROCESS

- Purpose is to assure CEBAF, DOE, and the User Community that CEBAF is ready for safe Testing, Commissioning, and Operations
- Based on CEBAF Readiness Plan
- Basic approach is to perform:
  - Substantive self-assessments by responsible line management who, by signature, certify the readiness of the item
  - Objective detailed review by appointed knowledgeable expert, who after satisfying him/her self, certifies agreement as to the readiness of the item
  - Analysis of Issues and Concerns and appropriate action
  - Peer review of process, issues, and concerns; report to DOE and SURA
- All activities open to DOE observation

# CEBAF READINESS PLAN

- Agreement between CEBAF and DOE
- Specifies procedures and documentation for ensuring CEBAF's readiness to conduct safe and meaningful preoperational tests, commissioning, and start of operations
  - Encompasses equipment, personnel, procedures
  - Emphasizes EH&S and addresses technical performance
  - Describes four multi-stage preops/commissioning phases:
    1. Front End Test (*complete*); Low Power Preops Testing (*under way 8/17/92*)
    2. High Power Preoperational Testing
    3. Commissioning: full accelerator, beam switchyard, Hall C
    4. Commissioning: Halls A & B
  - States readiness requirements for each stage within each phase
  - Names necessary safety and environmental documentation

# ACCELERATOR READINESS PROCEDURES

- Form ARR team
- Develop Readiness Tree and Criteria based on:
  - Best management practices at national laboratories
  - Best operational readiness practices
  - Site specific activities
- Perform in depth self assessment by:
  - Line management
  - ARR team
- Conduct independent peer review
- Bring closure to findings
- Obtain authorization by DOE to proceed

# ARR RESPONSIBILITIES

Reviewee (line manager):

- Identification and examination of objective evidence supporting readiness of the item
- Listing Issues or Concerns
- Making the above information and time available to the Reviewer

Reviewer (ARR team member):

- Scheduling appraisal times
- Examining the information presented by the Reviewee
- Listing Issues or Concerns
- Completing the review forms

Both: Certify the forms by signature

In case of disagreements, the matter becomes an Issue, thus allowing both to certify the forms by their signatures.



# ARR FINDINGS CLOSURE PROCEDURE

- A "Finding" is any Issue or Concern specifically called out in a report of the CEBAF ARR Team or Independent Review Committee
- A Finding is closed when the following conditions are fulfilled:
  - Agreement by reviewer and reviewee that the finding is resolved and closed
  - Certification by signature of the ARR Team Leader of closure and reporting to the Associate Director and Accelerator Division Head  
(Documentation shall be in the form of a one page summary containing the signatures of reviewee, reviewer, and ARR Team Leader)
- Issues must be closed prior to the start of High Power Testing
- Concerns must be closed or a plan in place for timely closure by the start of the ARR-3 kick-off
- The ARR Team Leader will issue a report to the Director when all Issues are closed
- The ARR Team Leader will issue a second report when all other Findings are closed

# CHARGE TO THE CEBAF ARR-2 COMMITTEE

- The Review Committee is charged with assessing CEBAF's readiness for safely conducting meaningful one-pass, high power tests, and with evaluating the appropriateness of CEBAF's readiness review process
- Specifically, in the area of high power test readiness, the committee is asked to answer the following questions on the basis and in the context of the CEBAF Readiness Plan, assuming completion of identified prerequisites currently in progress:
  - Are equipment, personnel, and procedures in place that ensure safe conduct of the high power tests?
  - Are technically meaningful tests likely, given the current status and projected developments of equipment, personnel, and procedures?
  - Is CEBAF's set of identified issues and concerns complete and properly addressed?

# CHARGE TO THE CEBAF ARR-2 COMMITTEE

## (cont'd)

- In the area of the readiness review process, the committee is asked to answer the following specific questions:
  - Is the Readiness Tree commensurate, efficient, and well thought out?
  - Are the lines of inquiry of the CEBAF readiness process effective, comprehensive, and in their level of depth and detail appropriate?
  - What opportunities exist for streamlining the process for subsequent scheduled reviews (ARR-3, ARR-4) without loss of rigor?
- The committee is asked to write a brief consensus summary of its findings before leaving the CEBAF site

# ARR-2 PARTICIPANTS AND OBSERVERS

## COMMITTEE MEMBERS

Lew Keller, Chairman

Donald P. Brown

Larry Coulson

Benedict Feinberg

Elizabeth Ipe

Bill Turchinetz

Russell Winje

## DOE/CEBAF SITE OFFICE

K. Dean Helms

W. Ortiz

J. Conley

B. Morgan

P. Grabowski

## EXPERTISE

Facility Operations

Cryogenics

Radiation Safety

Bevalac Ops Head & ALS ORR

Radiation Safety

Radiation Safety/Accel. Ops.

Electrical & Systems Safety

## OTHER DOE OBSERVERS

Dave Goodwin

DeVaughn Nelson

Joe McGrory

Sherman Fivozinsky



# ARR-2 PARTICIPANTS AND OBSERVERS (cont'd)

## SURA/CEBAF ATTENDEES

C. Leemann	B. Hartline	J. Coleman	R. Sundelin
C. Rode	A. Hutton	J. Domingo	M. Syptak
R. Whitney	S. Nanda	R. Carlini	B. Mecking
J. Boyce	B. May	C. Ficklen	P. Lindquist
J. Bisognano	G. Neil	F. Dylla	C. Sinclair
L. Harwood	E. Feldl	N. Dobeck	R. Nelson
P. Ward	J. Goodson	W. Schneider	S. Corneliussen

# ARR-2 LIBRARY

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# ARR-2 SUMMARY OF FINDINGS

- ARR-2 Review held November 4-5, 1992
- High Power Tests Readiness
  - CEBAF is ready to proceed within operating envelope of 120 kW beam power and within safety envelope of 150 kW beam power providing formal close-out of all Issues is completed
  - CEBAF is ready to proceed with beam tests in the south linac within the above envelopes as soon as ARR Team completes internal review of south linac
  - Technically meaningful tests are likely
  - The issues are complete and properly addressed

# ARR-2 SUMMARY OF FINDINGS (cont'd)

- Readiness Review Process
  - "The Committee found that the CEBAF Readiness Tree is 'state-of-the-art'"
  - Lines of inquiry are generally effective, comprehensive, and appropriate in their level of depth and detail
  - The review process contains the appropriate level of rigor
- Noteworthy Practices
  - Handoff process from Systems Support Group to Operations Group was particularly noteworthy



# ARR PRESENT STATUS

- ARR-0 - FET completed
- ARR-1 - Low Power Testing completed
- ARR-2 - High Power completed
- ARR-3 - Full Recirculation & Hall C late 1993/early 1994
- ARR-4 - Halls A & B late 1994/early 1995

# ARR SYNOPSIS OF BEAM TESTS

Test	Preoperational tests					Commissioning		
	Phase 1 Stage 1 FET	Stage 2 n-linac lp	Stage 3 e-arc	Phase 2 Stage 1 n-linac hp	Stage 2 s-linac	(tentative)		
						Phase 3 Stage 1 BSY to C	Stage 2 & 4 2-5 pass	Stage 3 3 beams
<b>E<sub>max</sub> (MeV)</b>	85	405	405	650	1200*	1200*	6000*	6000*
<b>E<sub>nom</sub> (MeV)</b>	85	245	245	365	800	800	4000	4000
<b>I<sub>min</sub> ** (μA)</b>	.1	.1	.1		.1	.1	.1	.1
<b>I<sub>max</sub> (μA)</b>	300	***	***	200	200	200	200	200
<b>P<sub>min</sub> ** (W)</b>	8.5	41	41		80	80	400	400
<b>P<sub>max</sub> † (kW)</b>	17 (20)	17 (20)	17 (20)	120 (150)	120 (150)	1200 (1500)	1200 (1500)	1200 (1500)
<b>Dumps (location, type)</b>	FET	1L15, lp	1L26, lp 135° wall	1L26, lp NE stub, hp	tune-up, hp	ES C	tune-up  ES C	tune-up  ES A, B, C
<b>Temp. shielding</b>	FET wall	1L23 wall	135° wall	135° wall				
<b>Start date</b>	10/11/90	8/16/92	11/01/92	11/01/92	Jan. 94	Feb. 94	Mar. 94	May 94
	ARR-0	ARR-1	ARR-2	ARR-3				ARR-4

\* Energy anticipated from current cryomodule performance corresponding to nominal energies listed

\*\* Minimum current (average cw equivalent) and power levels to reach test objectives

\*\*\* Current and energy commensurate with power into dump to be less than 17 kW

Dump types: lp = low power, hp = high power

† Operating Envelope (safety envelope)

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# ARR COSTS (ESTIMATE FOR ARR-2, -3, -4)

ARR activity	ARR effort (FTE-Year)
• Leadership	1.0
• Process development Develop tree, criteria, assessment process, certification, & closure	2.0
• Self assessment/validation Application of process validation & tracking	1.75
• Independent reviews	1.25
Total	6.0

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# BACKUPS

BACKUPS TO FOLLOW

# ARR-2 APPRAISAL FORM SPECIFIC INSTRUCTIONS

## The Focus:

"Ready to conduct safe meaningful High Power Pre-operational Tests."

- Reviewer takes blank form to Reviewee; they mutually agree on schedule
- Reviewee fills out form, producing a draft version
  - On each line on the form, at least two boxes must be checked, one for sub-system criteria and one for safety requirements
  - Issues, Concerns, or Comments should be cross referenced to the checked boxes by coding them with lower case letters
  - Keep notes of what you include in your review
- Reviewer visits Reviewee, checks on the validity of the draft version by inspecting documents, drawings, SQAPs, etc., as appropriate

*This step may take one full day or more!*

- Both fill out and sign a completed final ARR-2 Appraisal form

# ARR-2 ISSUES & CONCERNS

- Issues

Hardware	14
Personnel	0
Procedures	7
Total	21

- Concerns

Hardware	15
Personnel	18
Procedures	17
Total	50