OVERVIEW, TASKS AND GUIDELINES

MOHAMED A. ABDOU
UCLA

FINESSE PROJECT MEETING
MAY 15-16, 1984
UCLA

Revised
5/4/84

FINESSE PROJECT MEETING

May 15-16, 1984
UCLA Faculty Center, Sierra Room

Agenda

Tuesday, May 15

9:00 - 9:30	Overview	Abdou
9:30 - 12:15	Fluence Goals (What We Learn as a Function of Exposure) and Interactive Effects	
	HEDL: Presentation (60 min.) Discussion (20 min.)	Straalsund
	UCLA: Presentation (20 min.) Discussion (10 min.)	DiMelfi
	Solid Breeders: Presentation (30 min.) Discussion (10 min.)	Hollenberg
	(15 minute coffee-break around 10:30)	
12:15 - 1:00	Lunch	
1:00 - 3:15	Importance of Burn/Dwell Times and Other Device Parameters	
	Tritium Recovery: Presentation (45 min.) Discussion (30 min.)	Billone
	Thermal: Presentation (40 min.) Discussion (20 min.)	Taghavi
3:15 - 4:15	Availability Modeling: Presentation (45 min.) Discussion (15 min.)	Whitley
4:15 - 5:00	Fission Reactor Utilization: Presentation (30 min.) Discussion (15 min.)	Deis
5:00 - 5:30	Non-Nuclear Testing	Nygren
5:30 - 6:00	Non-Blanket Tests	Steele

Wednesday, May 16

8:30 - 9:45	Solid Breeder Engineering Scaling: Presentation (45 min.) Discussion (30 min.)	Gierszewski
9:45 - 11:30	Liquid Metal Engineering Scaling: MHD, Fluid Flow (30 min.) Thermomechanical (30 min.) Thermal (10 min.) Corrosion (15 min.) Discussion (20 min.)	 Tillack Garner Taghavi Bjorndahl
	(Coffee break around 10:30)	
11:30 - 12:15	Failure Modes: Presentation (30 min.) Discussion (15 min.)	Davis
12:15 - 1:00	Lunch	
1:00 - 2:30	Task I, Issues and Testing Needs - Scenarios, Requirements, and Format: Presentation (45 min.) Discussion (45 min.)	Abdou
2:30 - 3:00	Action Items	
3:00 - 3:15	Coffee Break	
3:15 - 4:45	Task I Subgroup Meetings: Subgroup A.1 (Same Room as General Meeting) Subgroup A.2 (6275 Boelter Hall) Subgroup B (6288 Boelter Hall) Subgroup C (5750 Boelter Hall)	
4:45 - 6:00	Management Group Meeting (Abdou, Berwald, Davis, Deis, Geirszewski, Kleefeldt, Seki, Straalsund, Tillack)	

FINESSE MEETING MAY 15-16, 1984

Focus of Meeting

1. Presentations and discussions on selected topics Tuesday (May 15) and Wednesday (May 16) mornings.

   - Ample time for presentations and discussions. However, we will be strict on keeping schedule.

2. Wednesday Morning

   - Format/schedule for Task I

   - New topics in Task II

Administrative Matters

1. Plans for July, August and September meetings.

2. Convening of Advisory Committee.

3. Plan for October workshop.

TASK 1 GUIDELINES

MOHAMED A. ABDOU
UCLA

FINESSE PROJECT MEETING
MAY 15-16, 1984
UCLA

TASK I ISSUES

- LIMIT TO ISSUES (ELIMINATE PART ON TESTING NEEDS; THESE ARE ADDRESSED IN TASK II).

- OUTPUT

  ISSUES SUMMARY SHEETS: ONE (OR TWO) PAGE PER ISSUE.
  ISSUES SUMMARY TABLES: ONE LINE PER ISSUE.

- STANDARD FORMAT FOLLOWS.

SUMMARY OF ISSUES FOR (BLANKET/FIRST WALL)[A]

Issue	Potential Impact	Design Specificity	Level of Concern	Operating Environment	
				Neutron	Parameters
← 4-1/2" →	← 1" →	← 1" →	← 1" →	← 3/4" →	← 1-1/4" →
Issue 1					
Issue 2					
Issue 3					
Issue 8 Sub-issue A Sub-issue B Sub-issue C					
Issue 12 Sub-issue A, Sub-issue B, Sub-issue C, . . .)					

[A]For non-blankets, use: Shield, Magnets, etc.

FORMAT FOR STANDARD TABLES
(Follow the guidelines on the following pages as closely as possible.)

GUIDELINES FOR SUMMARY OF ISSUES TABLES

COLUMN 1: ISSUES

- STATE THE ISSUE CONCISELY.

- SHOULD BE DESCRIPTIVE AND EXPLAIN THE ISSUE RATHER THAN JUST A HEADING FOR A TOPIC (REQUIRES THINKING).

- PREFERRABLY SHOULD FIT ON A SINGLE LINE IN THE SPACE ALLOWED (4 1/2", ABOUT 6 TO 7 WORDS); HOWEVER, TWO LINES ARE PERMISSIBLE IF NECESSARY.

GUIDELINES FOR SUMMARY OF ISSUES TABLES

COLUMN 2: POTENTIAL IMPACT

SELECT ONE OR MORE NUMBERS FROM THE FOLLOWING LIST:

1 ≡ SERIOUS IMPLICATIONS ON DESIGN LIMIT/DESIGN WINDOW.

2 ≡ SYSTEM FAILURE WITH SERIOUS SAFETY IMPLICATIONS.

3 ≡ SYSTEM FAILURE WITH SERIOUS IMPLICATIONS ON OPERATION AND AVAILABILITY (INCLUDES RELIABILITY AND MAINTAINABILITY).

4 ≡ REDUCED SYSTEM PERFORMANCE IMPLICATIONS.

5 ≡ REDUCED COMPONENT LIFETIME IMPLICATIONS.

6 ≡ INCREASED SYSTEM COST IMPLICATIONS.

7 ≡ LESS DESIRABLE SAFETY AND/OR ENVIRONMENTAL IMPLICATIONS.

NOTE

THE LEVEL OF IMPORTANCE OF THE ISSUE DEPENDS IN A GENERAL WAY ON THE NUMBER ASSIGNED FOR THE POTENTIAL IMPACT (1 IS THE MOST IMPORTANT, 7 IS THE LEAST IMPORTANT).

GUIDELINES FOR SUMMARY OF ISSUES TABLES

COLUMN 3: DESIGN SPECIFICITY

SELECT ONE OF THE FOLLOWING HEADINGS:

GENERIC ≡ GENERIC TO FUSION OR THE COMPONENT (E.G., BLANKET, MAGNET, ETC.).

GEN./XXXXX ≡ GENERIC TO A BROAD DESIGN CLASS (E.G., LIQUID METALS OR LI OR LIPB OR Li_2O, ETC.).
EXAMPLES: GEN./LIPB
GEN./HELIUM

DESIGN ≡ DESIGN DEPENDENT.

GUIDELINES FOR SUMMARY OF ISSUES TABLES

COLUMN 4: LEVEL OF CONCERN

SELECT ONE OF THE FOLLOWING CATEGORIES:

CRITICAL ≡ MOST IMPORTANT

HIGH ≡ HIGH PRIORITY

MEDIUM ≡ IMPORTANT

LOW ≡ LOW PRIORITY/NICE TO HAVE

NOTE 1

ISSUES SHOULD APPEAR ON THE TABLE IN DESCENDING ORDER OF LEVEL OF CONCERN (ALL CRITICAL ISSUES, ALL LOW PRIORITY ISSUES LAST).

NOTE 2

THIS COLUMN IS TO INDICATE THE OVERALL LEVEL OF CONCERN (IMPORTANCE) OF THE ISSUE. IT WILL BE USED EXTENSIVELY IN OTHER PARTS OF FINESSE (E.G., TASKS II, V AND VI). USE "EXPERT JUDGMENT." CONSULT WITH YOUR GROUP AND OTHERS. PROJECT MANAGERS MAY LATER HAVE TO "NORMALIZE" THE JUDGMENT IN DIFFERENT AREAS. SOMEHOW, THE RANKING IN COLUMN 4 SHOULD REFLECT A PRODUCT OF COLUMNS 2 AND 3.

GUIDELINES FOR SUMMARY OF ISSUES TABLES

COLUMN 5: OPERATING ENVIRONMENT/NEUTRONS

USE (--) IF NEUTRONS HAVE NO EFFECT; OTHERWISE, USE ONE OR MORE OF THE FOLLOWING SYMBOLS:

H ≡ NEUTRONS ARE A SOURCE OF HEATING.

R ≡ NEUTRONS PRODUCE SPECIFIC REACTIONS.

D ≡ NEUTRONS PRODUCE MATERIAL DAMAGE.

COLUMN 6: OPERATING ENVIRONMENT/PARAMETERS

USE ANY APPROPRIATE COMBINATION OF SYMBOLS FROM THE FOLLOWING TABLES TO INDICATE KEY ELEMENTS OF THE OPERATING ENVIRONMENT/ PARAMETERS. THIS PROVIDES INDICATIONS OF THE PARAMETERS TO BE EXAMINED IN TESTING REQUIREMENTS BUT DOES NOT NECESSARILY IMPLY A JUDGMENT ABOUT WHAT MUST BE PROVIDED IN THE TEST ENVIRONMENT.

B	≡ MAGNETIC FIELD	Q	≡ SURFACE HEAT LOAD
$\dot{B}$	≡ RATE OF CHANGE OF B	G	≡ GEOMETRY (SHAPE OR SIZE)
ϕ	≡ FLUX, NEUTRON WALL LOAD HEATING RATE	I	≡ IMPURITIES
S	≡ NEUTRON SPECTRUM	T	≡ TEMPERATURE
F	≡ NEUTRON FLUENCE	V	≡ VELOCITY
τ	≡ OPERATING TIME	σ	≡ STRESS

ISSUES WRITE-UP

ONE PAGE PER ISSUE. ONLY CRITICAL OR HIGH-LEVEL ISSUES MAY EXCEED ONE PAGE (BUT NOT MORE THAN TWO PAGES).

FORMAT

ISSUE: SAME AS COLUMN 1 OF SUMMARY TABLE.

DESCRIPTION: ONE OR TWO PARAGRAPHS TO DESCRIBE ISSUE AND WHY IT IS AN ISSUE.

POTENTIAL IMPACT: STATE CATEGORY FROM COLUMN 2 AND ELABORATE IN TWO TO THREE SENTENCES.

DESIGN SPECIFICITY: ONE OR TWO SENTENCES ELABORATING ON COLUMN 3.

OVERALL LEVEL OF CONCERN:
(COLUMN 4.) TWO TO THREE SENTENCES TO CHARACTERIZE AND RATIONALIZE THE LEVEL OF CONCERN.

OPERATING ENVIRONMENT/NEUTRONS:
TWO TO THREE SENTENCES EXPLAINING THE ROLE OF NEUTRONS. (IF NO EFFECT, SIMPLY PUT A PHRASE "NO EFFECT.")

OPERATING ENVIRONMENT/PARAMETERS:
STATE PARAMETERS IN COLUMN 6. (USE WORDS INSTEAD OF SYMBOLS, E.G., TEMPERATURE INSTEAD OF T). IF POSSIBLE, GIVE THE RANGE OF TYPICAL OPERATING CONDITIONS (E.G., TEMPERATURE = 400-500°C, STRESS = 45-60 MPA, ETC.).

GENERAL REMARKS ON
ISSUES (AND SUB-ISSUES) TO BE INCLUDED

- INCLUDE ALL RELEVANT ISSUES THAT NEED TO BE SOLVED FROM NOW UNTIL FUSION POWER DEMONSTRATION.

- EMPHASIZE ISSUES THAT WILL REQUIRE INTERACTIVE/INTEGRATED TESTING AND NEUTRONS. TRY HARD TO INCLUDE SUCH ISSUES.

- AN ISSUE MAY CONTAIN A NUMBER OF SUB-ISSUES THAT NEED TO BE MENTIONED (FACILITATE GROUPING). THIS CAN BE EASILY ACCOMMODATED IN THE STANDARD FORMAT BY LISTING THE ISSUE FOLLOWED BY THE SUB-ISSUES (SUB-ISSUE A, SUB-ISSUE B, ETC.).

  - ON SUMMARY TABLES: SUB-ISSUES CAN BE LISTED UNDER THE ISSUE IN COLUMN 1. ENTRIES IN THE REST OF THE COLUMNS MAY OR MAY NOT BE ENTERED FOR EACH SUB-ISSUE.

  - ON SUMMARY SHEETS: SOME EXPLANATION OF SUB-ISSUES SHOULD BE PROVIDED. EXCEEDING PAGE LIMIT IS OK (ROUGHLY A HALF PAGE OR LESS PER EACH ADDITIONAL SUB-ISSUE).

SUBGROUPS FOR TASK I

BLANKET/FIRST WALL

SUBGROUP A.1: MATERIALS AND INTERACTIVE EFFECTS
(STRAALSUND, PUIGH, DIMELFI, DAVIS, OTHERS)

SUBGROUP A.2: FAILURE MODES AND STRUCTURAL RESPONSE
(DAVIS, MORGAN, PUIGH, GARNER, DIMELFI, GROTZ, CRAMER, OTHERS)

SUBGROUP B: THERMAL AND CORROSION
(DEIS, TAGHAVI, TILLACK, BJORNDAHL, MADARAME, OTHERS)

SUBGROUP C: SOLID BREEDERS AND TRITIUM
(HOLLENBERG, GIERSZEWSKI, LIU, DIMELFI, MILLER, JOHNSON, BILLONE, CLEMMER, OTHERS)

SUBGROUP D: NEUTRONICS
(ABDOU, BERWALD, YOUSSEF, STEELE, SEKI)

SUBGROUP E: SAFETY
(DEIS/SEKI, PIET, GIERSZEWSKI, TILLACK, GARNER, TAGHAVI)

SUBGROUP F: INTERFACES AND SYSTEM INTEGRATION
(BERWALD, GROVER, STEELE, GROTZ, MORGAN)

SUBGROUPS FOR TASK I

NON-BLANKETS

SHIELD:

(STEELE, SEKI, YOUSSEF)

PLASMA INTERACTIVE COMPONENTS (FIRST WALL, IMPURITY REMOVAL AND CONTROL, SUPPLEMENTARY HEATING, VACUUM SYSTEM):

(KLEEFELDT/STEELE, ABDOU, MATTAS, BROOKS, GIERSZEWSKI, BERWALD, OPPERMAN)

TRITIUM PROCESSING AND CONTAINMENT:

(GIERSZEWSKI, CLEMMER/FINN, DEIS, LANL/TSTA, LIU)

HEAT TRANSPORT AND POWER CONVERSION:

(STEELE, GROTZ, TAGHAVI, DEIS, BJORNDAHL, OTHERS)

MAGNETS:

(STEELE, OTHERS TO BE ASSIGNED)

MAINTENANCE:

(MORGAN, OTHERS TO BE ASSIGNED)

BALANCE OF PLANT:

(TO BE ASSIGNED)

PROCEDURE AND SCHEDULE FOR TASK I

BLANKET/FIRST WALL

- EACH SUBGROUP SHOULD DEVELOP THE ISSUES SUMMARY SHEETS AND TABLES. REVIEW WHAT WE ALREADY DID AND TRY TO IMPROVE.

- SUBGROUP LEADERS HAVE THE RESPONSIBILITY FOR COMPLETING THEIR PART OF TASK I BY JUNE 1.

- SEND SUMMARY SHEETS AND TABLES TO:

  G. D. MORGAN (MDAC)
  M. S. TILLACK (UCLA)

- MORGAN AND TILLACK WILL:

  1. REVIEW ALL SUMMARY SHEETS AND TABLES FOR COMPLETENESS, DUPLICATION, CONSISTENCY, ETC. THEY WILL CONSULT WITH SUBGROUPS FOR CHANGES, MODIFICATIONS, ETC.

  2. PREPARE DRAFT OF FINAL SHEETS AND TABLES. MAY REORGANIZE THE SUBGROUPS' OUTPUT (E.G., FOR THE BLANKET/FIRST WALL, ALL CRITICAL ISSUES IN ALL DISCIPLINES FIRST, FOLLOWED BY HIGH PRIORITY ISSUES, ETC.).

  3. MORGAN AND TILLACK WILL MAIL DRAFTS OF FINAL SHEETS AND TABLES TO ALL FINESSE PARTICIPANTS BY JUNE 11.

     - COMMENTS BY ALL PARTICIPANTS DUE BACK TO MORGAN AND TILLACK BY JUNE 22.

     - FINAL CHAPTER COMPLETED AND FINAL PRESENTATIONS JULY 10.

APPENDIX I.A

CHARACTERIZATION OF NUCLEAR SYSTEMS OPERATING ENVIRONMENT

OUTLINE OF APPENDIX

1. INTRODUCTION
2. RADIATION FIELD (YOUSSEF, SHIN; < 30 PAGES)
3. BLANKET/FIRST WALL (MORGAN, ET AL; < 30 PAGES)
4. PLASMA-INTERACTIVE COMPONENTS (KLEEFELDT, STEELE; < 10 PAGES)
5. TRITIUM SYSTEMS (GIERSZEWSKI; < 10 PAGES)

OTHERS TO BE ASSIGNED LATER.

CONTENT

- EXAMPLES OF DESIGN CONCEPTS, THEIR DESCRIPTIONS, OPERATING PARAMETERS AND RANGES.
- RADIATION FIELD SECTION SHOULD CHARACTERIZE ALL NEUTRONICS PARAMETERS (FLUX, SPECTRUM, DPA, HE, H, ACTIVATION) IN ALL REACTOR COMPONENTS.
- FOR EXAMPLE, BLANKET SECTION INCLUDES THE FOUR EXAMPLE REFERENCE CONCEPTS FOR FINESSE FROM BCSS. IT SHOULD INCLUDE CHARACTERIZATION OF ELECTROMAGNETIC, NEUTRONICS, TRITIUM, ETC.
- TRITIUM SYSTEMS SHOULD COVER ALL SYSTEMS WHERE TRITIUM IS IMPORTANT. INDICATE PATHWAYS. INCLUDE TRITIUM PROCESSING SYSTEMS.
- OTHER SECTIONS SHOULD BE BRIEF. THE PURPOSE IS TO HIGHLIGHT THE SYSTEM AND EXPECTED RANGE OF OPERATING CONDITIONS. FIGURES AND TABLES ARE EFFECTIVE.

TASK II GUIDELINES

MOHAMED A. ABDOU
UCLA

FINESSE PROJECT MEETING
MAY 15-16, 1984
UCLA

TASK II: TESTING NEEDS

TASK II.A: SURVEY OF TESTING NEEDS

- QUICK, SEMI-QUANTITATIVE EXPERT JUDGMENT APPROACH TO SURVEYING ALL IMPORTANT TESTING NEEDS.
- PREVIOUSLY WAS PART OF TASK I.

TASK II.B: QUANTIFYING KEY TESTING REQUIREMENTS

- DETAILED QUANTITATIVE ANALYSIS TO QUANTIFYING TESTING REQUIREMENTS (IMPORTANCE TO DEVICE PARAMETERS) FOR A LIMITED NUMBER OF CRITICAL AND HIGH PRIORITY ISSUES. (THIS HAS BEEN THE FOCUS OF OUR EFFORT IN TASK II THUS FAR.)

TASK II.C: TEST MATRIX

- NUMBER, SIZE, GEOMETRY FOR NEEDED TESTS:
  1. MATERIALS SPECIMENS
  2. INTERACTIVE TESTS
  3. INTEGRATED TESTS

- EXAMPLES OF TEST SPECIMEN, ELEMENT, AND MODULE DESIGNS.

TASK II.D: SUMMARY OF TEST REQUIREMENTS AND PRIORITIES

- TEST REQUIREMENTS (DEVICE PARAMETERS/ENVIRONMENT, NUMBER, SIZES) AND PRIORITIES.

- USED AS INPUT TO COMPARING FACILITIES IN TASKS IV-VI.

- THIS IS THE "NUCLEAR TESTING NEEDS" OUTPUT FOR THE COMMUNITY.

TASK II.A: SURVEY OF TESTING NEEDS

- PROJECT-WIDE TASK TO PROVIDE REASONABLY COMPLETE SURVEY OF TESTING NEEDS.

- THE APPROACH IS TO USE "EXPERT JUDGMENT," WITH LIMITED QUANTIFICATION WITHIN THE STUDY RESOURCES, TO DEFINE TESTING REQUIREMENTS.

- ORGANIZATION/RESPONSIBILITIES

  - IDENTICAL TO THAT OF TASK I (SAME SUBGROUPS, SUBGROUP LEADERS, AND SUBGROUP MEMBERS).

- TASK II.A WRITEUPS

  - STANDARD FORMAT DEFINED IN THE FOLLOWING PAGES: SUMMARY TABLES AND SUMMARY SHEETS

STANDARD FORMAT: TASK II.A SUMMARY TABLES

TABLE II.A.1 SUMMARY OF TESTING NEEDS IN FUSION FACILITIES FOR (BLANKET/FIRST WALL)[A]

Issues/Tests Category	Importance of Neutrons	Importance of Fusion Spectrum	Other Required Environment	Test Element Size cm x cm x cm	Number of Test Elements	Level of Need for Comp. Availability		
						10%	50%	95%
Issues/Tests Category 1								
Issues/Tests Category 2								
etc.								

[A]For non-blanket components use: Shield, Magnets, etc.

STANDARD FORMAT: TASK II.A SUMMARY TABLES

TABLE II.A.2 SUMMARY OF USEFULNESS AND LIMITATIONS OF NON-FUSION TEST FACILITIES FOR BLANKET/FIRST WALL[A]

Issues/Tests Category	Test Stands		Point Neutron Sources		Fission Reactors		Level of Adequacy for Comp. Availability		
	Usefulness	Limitations	Usefulness	Limitations	Usefulness	Limitations	10%	50%	95%
Issues/Tests Category 1									
Issues/Tests Category 2									
etc.									

[A]For non-blanket components use: Shield, Magnets, etc.

EXPLANATION OF ENTRIES IN TABLE II.A.1

COLUMN 1: ISSUES/TESTS CATEGORY

HEADING FOR ISSUE OR GROUPS OF ISSUES THAT HAVE SIMILAR TEST REQUIREMENTS (ISSUES FROM TASK I).

COLUMN 2: IMPORTANCE OF NEUTRONS

SELECT ONE OF THE FOLLOWING CATEGORIES:

CRITICAL ≡ MOST DEFINITELY NEEDED

HIGH ≡ VERY IMPORTANT

MEDIUM ≡ IMPORTANT

LOW ≡ NICE TO HAVE

COLUMN 3: IMPORTANCE OF FUSION SPECTRUM

SELECT ONE OF THE FOLLOWING CATEGORIES:

CRITICAL ≡ MOST DEFINITELY NEEDED

HIGH ≡ VERY IMPORTANT

MEDIUM ≡ IMPORTANT

LOW ≡ NICE TO HAVE

EXPLANATION OF ENTRIES IN TABLE II.A.1
(CONTINUED)

COLUMN 4: OTHER REQUIRED ENVIRONMENTS

STATE OTHER NON-NEUTRON ENVIRONMENTS REQUIRED IN THE TEST. USE ABBREVIATIONS. FOR EXAMPLE:

- VAC ≡ VACUUM
- EM ≡ ELECTROMAGNETICS
- TRIT ≡ TRITIUM
- PMI ≡ PLASMA-MATERIAL INTERACTION SIMULATION (IONS, ELECTRONS, NEUTRALS)

COLUMN 5: TEST ELEMENT SIZE (CM X CM X CM)

OVERALL SIZE OF THE TEST ELEMENT (OUTERMOST DIMENSIONS, I.E., PHYSICAL SPACE IT WILL ACTUALLY OCCUPY IN TEST FACILITY).

EXAMPLE: 10 x 12 x 25

ALTERNATIVE: 50 CM^3
(NOT RECOMMENDED)

COLUMN 6: NUMBER OF TEST ELEMENTS

- GIVE AN APPROXIMATE NUMBER OF THE TEST ELEMENTS REQUIRED TO ADDRESS THE ISSUES/TESTS CATEGORY.
- EACH OF THESE ELEMENTS HAS AN AVERAGE SIZE SPECIFIED IN THE PREVIOUS COLUMN.
- IN ESTIMATING NUMBER OF TEST ELEMENTS, CONSIDER ALL NECESSARY VARIATIONS FOR AN ADEQUATE TEST MATRIX (MATERIALS, GRAIN SIZE, IMPURITY CONTENT, TEMPERATURE, CHEMISTRY, FLUX, FLUENCE).
- THIS "GUESS" NUMBER WILL BE CHECKED LATER FOR CONSISTENCY WITH THE MORE DETAILED TEST MATRIX IN TASK II.C.

EXPLANATION OF ENTRIES IN TABLE II.A.1
(CONTINUED)

COLUMNS 7, 8, AND 9: LEVEL OF NEED FOR COMPONENT AVAILABILITY

OVERALL LEVEL OF NEED FOR TESTING IN A FUSION FACILITY TO ACHIEVE A COMPONENT AVAILABILITY OF (THE COMPONENT IS THAT CONSIDERED IN THE TABLE, E.G., BLANKET/FIRST WALL OR SHIELD OR IN-VESSEL COMPONENT):

COLUMN 7:	10% AVAILABILITY
COLUMN 8:	50% AVAILABILITY
COLUMN 9:	95% AVAILABILITY

ENTRIES IN COLUMNS 7, 8, AND 9

IN EACH COLUMN, SELECT ONE OF THE FOLLOWING CATEGORIES:

CRITICAL	≡	MOST DEFINITELY NEEDED
HIGH	≡	VERY IMPORTANT
MEDIUM	≡	IMPORTANT
LOW	≡	NICE TO HAVE

NOTES

- THE AVAILABILITY OF THE COMPONENT CONSIDERED AT THE END OF TEST IN FUSION FACILITY. THE TIME IT TAKES FOR TESTING IN THE FUSION FACILITY IS VARIABLE AND NOT ADDRESSED HERE.
- THE KEY POINT HERE IS A JUDGMENT ON THE INITIAL AVAILABILITY OF THE COMPONENT AFTER NON-FUSION TESTING AND BEFORE ANY FUSION TESTING. IF, FOR EXAMPLE, THIS INITIAL AVAILABILITY IS JUDGED TO BE 30%, THE ENTRIES IN COLUMNS 7, 8, AND 9 CAN BE LOW, HIGH AND CRITICAL, RESPECTIVELY.
- PROBLEM: IT IS DIFFICULT TO DO THIS PER ISSUE/TEST CATEGORY. IT IS ACTUALLY NEEDED FOR THE COMPONENT BASED ON COLLECTIVE ESTIMATE FOR ALL ISSUES/TESTS. SUGGESTIONS?

EXPLANATION OF ENTRIES IN TABLE II.A.2

COLUMN 1: ISSUES/TESTS CATEGORY

SAME AS FOR TABLE II.A.1.

COLUMNS 2 AND 3: TEST STANDS

COLUMN 2: USEFULNESS

SELECT ONE OF: HIGH, MEDIUM, LOW

COLUMN 3: LIMITATIONS

STATE CONCISELY THE LIMITATIONS (USE SYMBOLS AND FOOTNOTES). EXAMPLES OF LIMITATIONS: SIZE, LACK OF NEUTRONS IN THE TEST ENVIRONMENT, SPECTRUM, LACK OF ELECTROMAGNETIC FIELD, ETC.

COLUMNS 4 AND 5: POINT NEUTRON SOURCES

SAME FORMAT AS COLUMNS 2 AND 3, RESPECTIVELY.

COLUMNS 6 AND 7: FISSION REACTORS

SAME FORMAT AS COLUMNS 2 AND 3, RESPECTIVELY.

COLUMNS 8, 9 AND 10: LEVEL OF ADEQUACY FOR COMPONENT AVAILABILITY

OVERALL LEVEL OF ADEQUACY OF NON-FUSION TESTING TO ACHIEVE A COMPONENT AVAILABILITY WHEN OPERATED IN FUSION ENVIRONMENT (WITHOUT ANY PRIOR FUSION TESTING) OF 10% (COLUMN 8), 50% (COLUMN 9) AND 95% (COLUMN 10). IN EACH COLUMN, ENTER ONE OF THE FOLLOWING:

VERY HIGH	≡	99% CONFIDENCE, NO NEED FOR FUSION TESTING
HIGH	≡	75% CONFIDENCE, FUSION TESTING MAY BE IMPORTANT
MEDIUM	≡	50% CONFIDENCE, FUSION TESTING MAY BE VERY IMPORTANT
LOW	≡	LOW CONFIDENCE, FUSION TESTING CRITICAL

SUMMARY SHEETS FOR TASK II.A

- For each Issues/Tests Category in Tables II.A.1 and II.A.2, write explanatory notes for each entry in the table.

- Number of pages: < 3 per Issues/Tests Category

- Format: Follow the same order for entries in tables. Format is not strict in order to allow flexibility (e.g., combining the writeups for several entries in the summary tables).

ORGANIZATION/SCHEDULE FOR TASK II.A

- SAME SUBGROUPS, LEADERS, AND MEMBERS AS TASK I (BLANKET AND NON-BLANKET SUBGROUPS).

- OVERALL COORDINATOR OF TASK II.A: PAUL GIERSZEWSKI (UCLA)

- SCHEDULE:

  - JUNE 11: SUBGROUPS MAIL SUMMARY TABLES AND SHEETS TO ALL FINESSE PARTICIPANTS.

  - JUNE 22: COMMENTS FROM FINESSE PARTICIPANTS BACK TO SUBGROUP LEADERS.

  - PAUL AND SUBGROUP LEADERS WILL COORDINATE THE ORGANIZATION OF DRAFTS OF FINAL SUMMARY TABLES AND SHEETS.

  - JULY 12: PRESENTATIONS AND FINAL CHAPTER COMPLETED.

TASK II.B: QUANTIFYING KEY TEST REQUIREMENTS

- THIS IS WHAT WE HAVE BEEN SPENDING MOST OF OUR EFFORT ON IN TASK II THUS FAR. APPROACH/ORGANIZATION SHOULD BE CLEAR.

- TOPICS: "ENGINEERING SCALING"
  "ACT-ALIKE TEST MODULES"
  "IMPORTANCE OF DEVICE PARAMETERS"

- PORTIONS WERE REVIEWED IN APRIL AND MAY MEETINGS.

- NEED PRELIMINARY CONCLUSIONS IN "JULY" IN AS MANY AREAS AS POSSIBLE.

- IMPORTANCE OF TEST DEVICE PARAMETERS:

NEUTRON WALL LOAD SURFACE HEAT LOAD MAGNETIC FIELD STRENGTH	UCLA/TRW
FLUENCE	HEDL
BURN/DWELL TIMES	UCLA/ANL
MINIMUM CONTINUOUS TIME	UCLA/OTHERS
SURFACE AREA VOLUME FOR TESTING	UCLA/TRW/HEDL

TASK II.C: TEST MATRIX

1. NUMBER, SIZE, GEOMETRY FOR NEEDED TESTS:
   - MATERIALS SPECIMENS
   - INTERACTIVE TESTS
   - INTEGRATED TESTS

2. EXAMPLES OF TEST SPECIMEN, ELEMENT, AND MODULE DESIGNS

NOTES

- THIS TASK REQUIRES INPUT FROM TASKS II.A AND II.B.
- WILL BE CARRIED OUT IN THE JULY-AUGUST PERIOD.
- HEDL SHOULD PREPARE A PRESENTATION FOR JULY TO DISCUSS CONSIDERATIONS IN DEVELOPING TEST MATRIX. (VARIATIONS FOR NUMBER OF BLANKET CONCPETS; VARIATIONS IN CONFIGURATION, TEMPERATURE, FLUX, FLUENCE, STATISTICS, ETC.)