

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**PRESENTATION TO
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD**

**SUBJECT: WASTE PACKAGE AND
ENGINEERED BARRIER
SYSTEM ALTERNATIVE
DESIGN APPROACH**

PRESENTER: DR. LESLIE JARDINE

**PRESENTER'S TITLE
AND ORGANIZATION: TECHNICAL PROJECT OFFICER
LAWRENCE LIVERMORE NATIONAL LABORATORY
LIVERMORE, CALIFORNIA**

**PRESENTER'S
TELEPHONE NUMBER: (415) 423-5032**

--- AUGUST 28-29, 1990 ---

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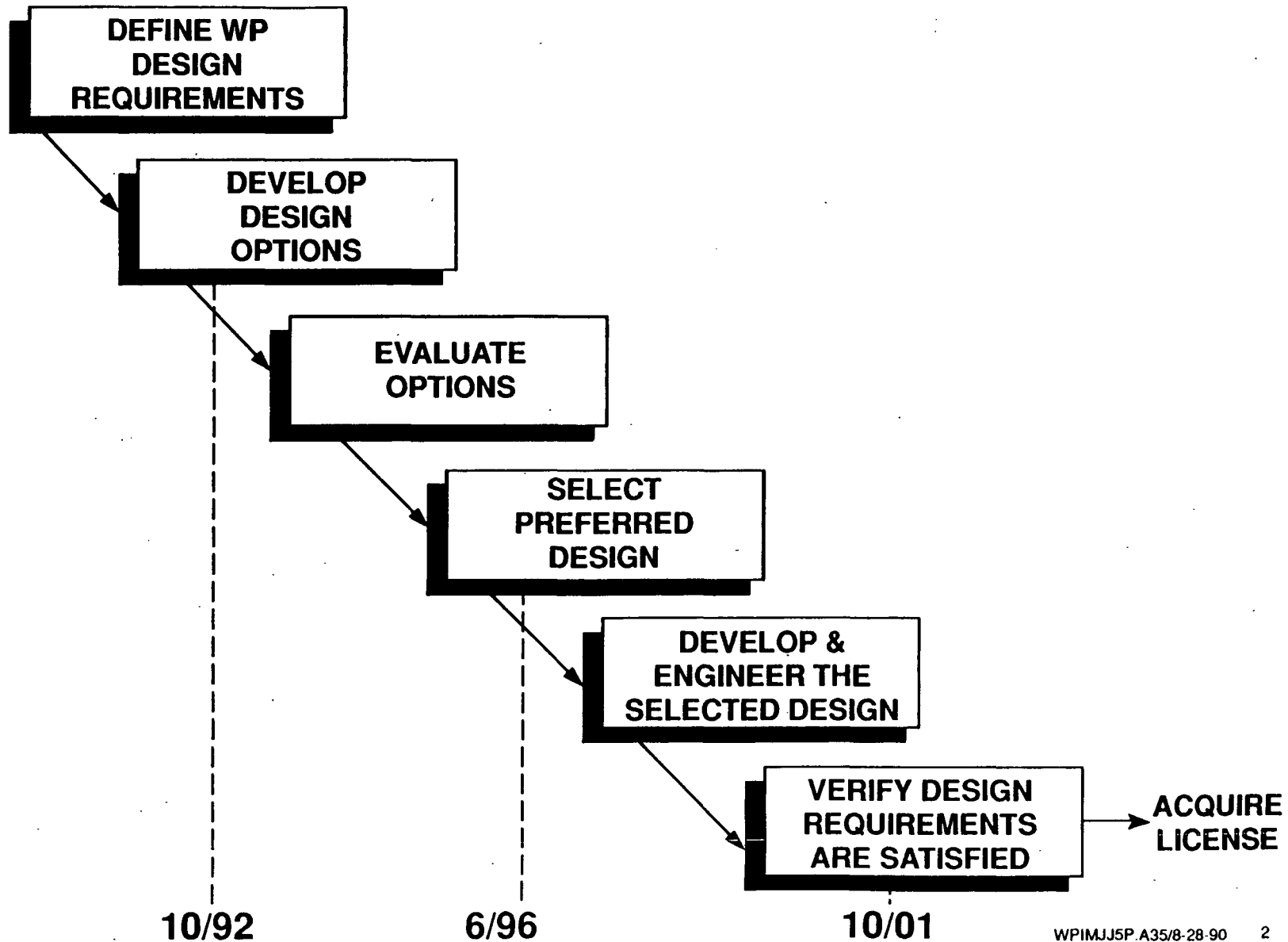
AUGUST 28-29, 1990

OUTLINE

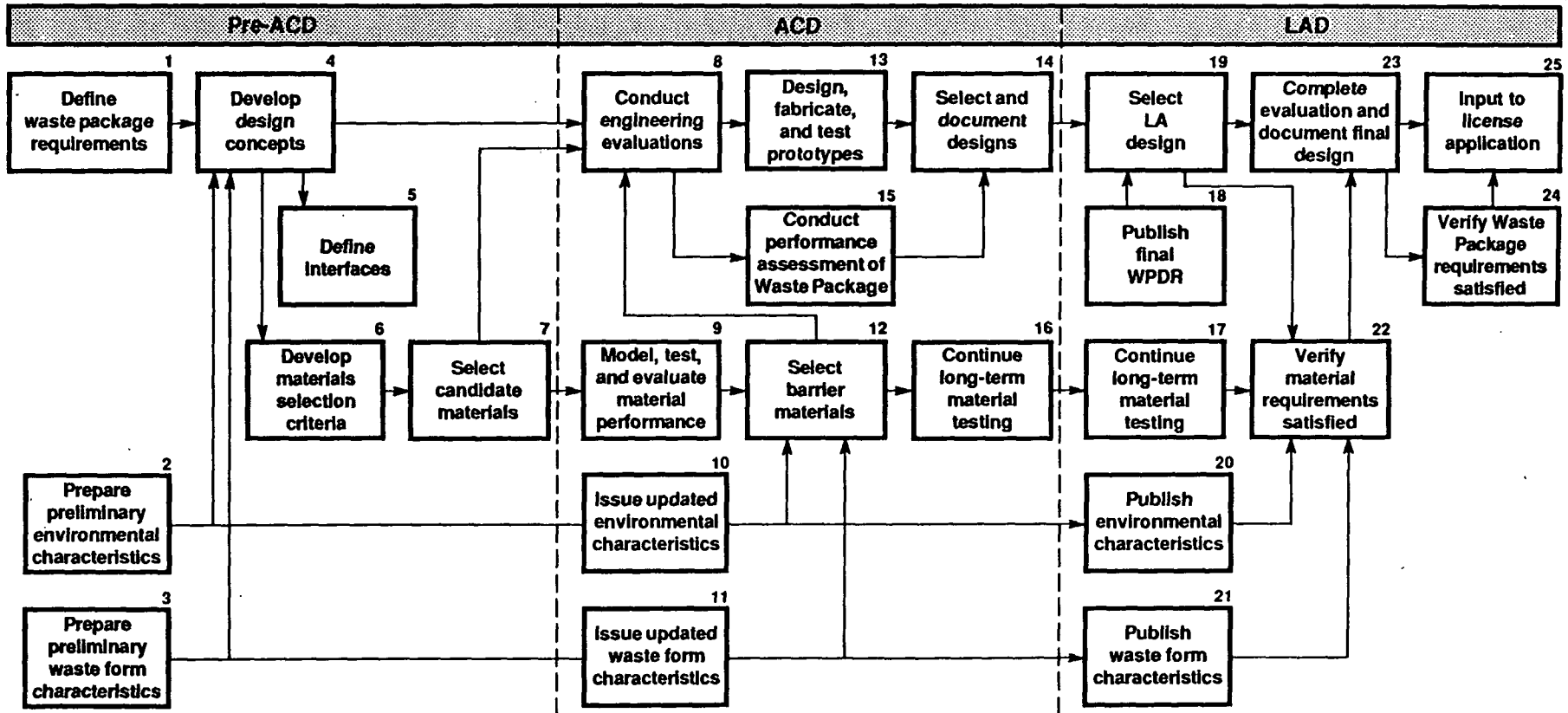
APPROACH FOR ESTABLISHING ALTERNATIVE WASTE PACKAGE AND EBS DESIGNS

- SYSTEMS ENGINEERING BASED METHODOLOGY
- ILLUSTRATIVE (ONLY) EXAMPLES OF METHODOLOGY
- SUMMARY

A CLASSIC SYSTEMS ENGINEERING APPROACH WILL BE USED

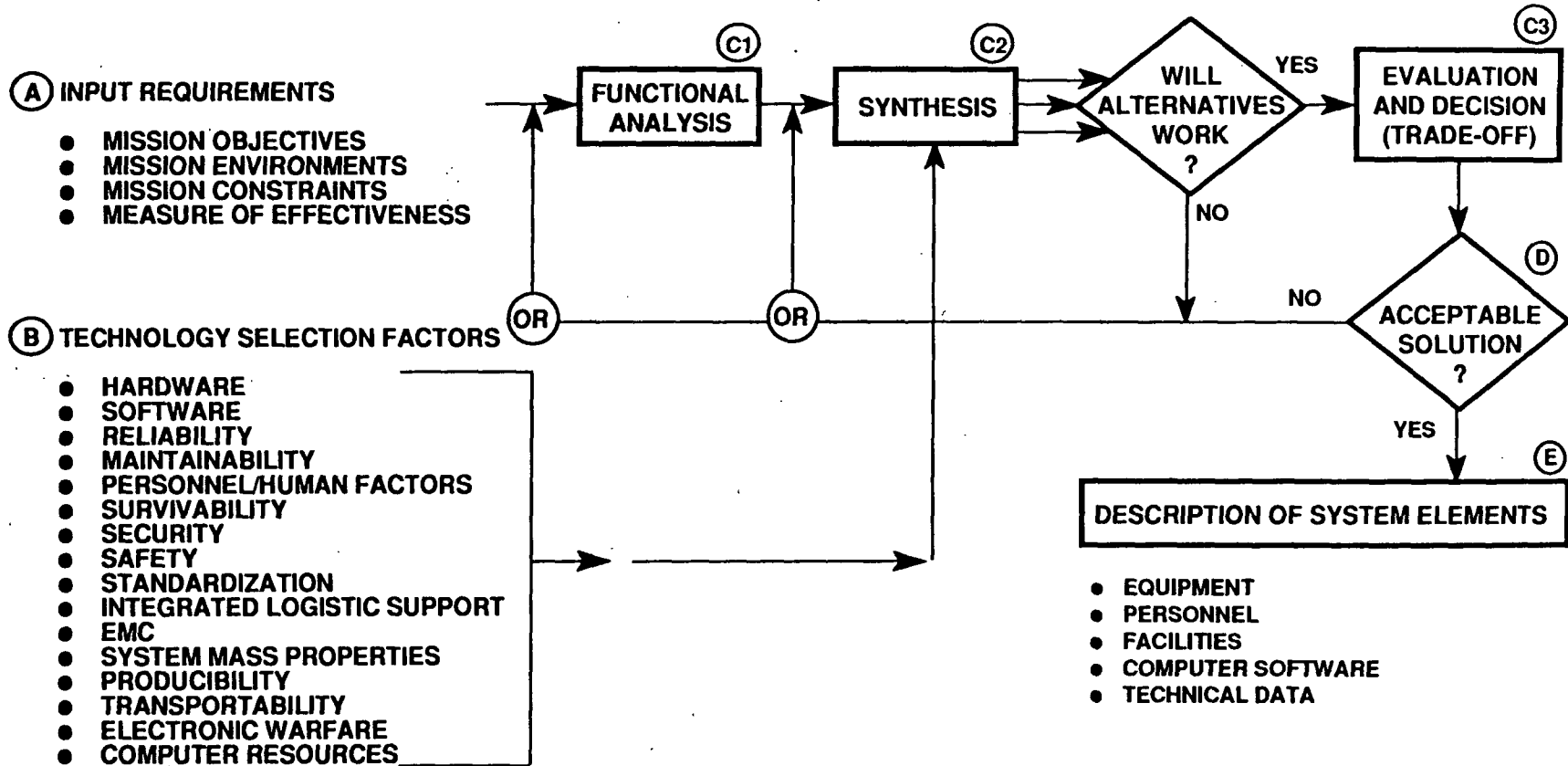


FLOW DIAGRAM OF WASTE PACKAGE PROGRAM



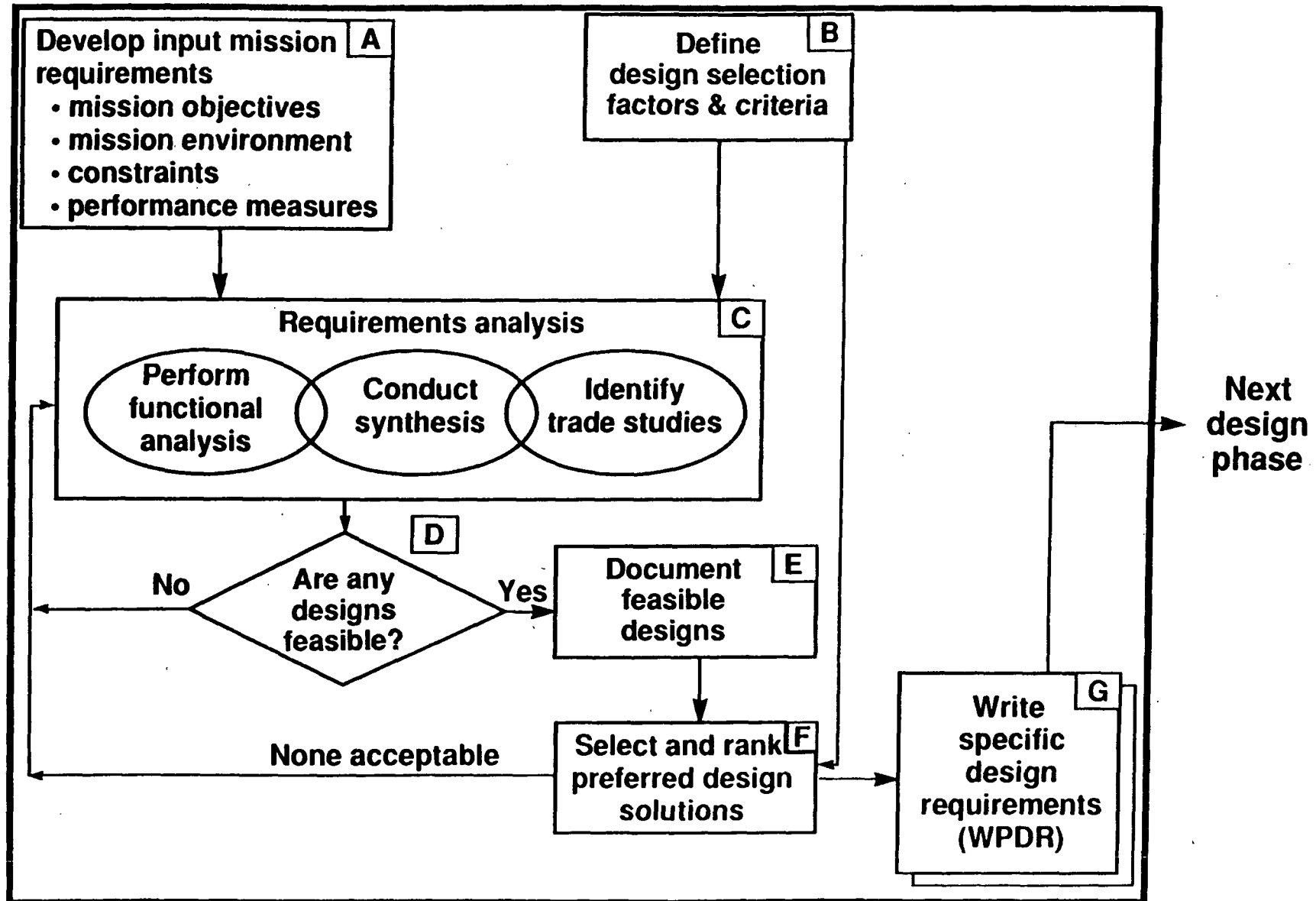
WPPFLOW.038/8-4-90

THE SYSTEMS ENGINEERING PROCESS

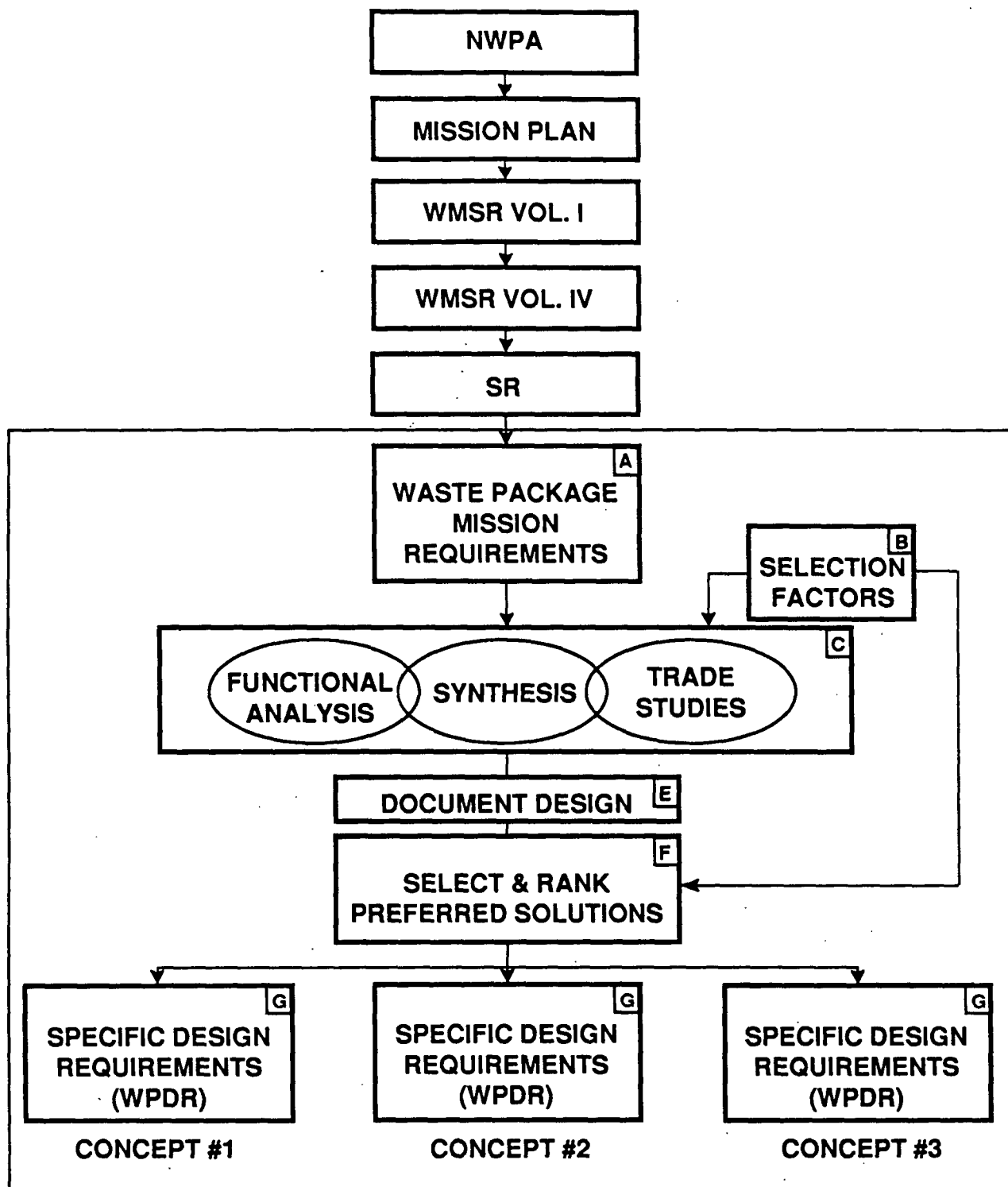


REFERENCE: 1. SYSTEMS ENGINEERING FIELD MANUAL FM-770-78 (APRIL 1979)
 2. DEFENSE SYSTEMS MANAGEMENT COLLEGE SYSTEMS ENGINEERING MANAGEMENT GUIDE SECOND EDITION, DECEMBER 1986

SYSTEMS ENGINEERING APPROACH: DEFINE REQUIREMENTS OF WASTE PACKAGE



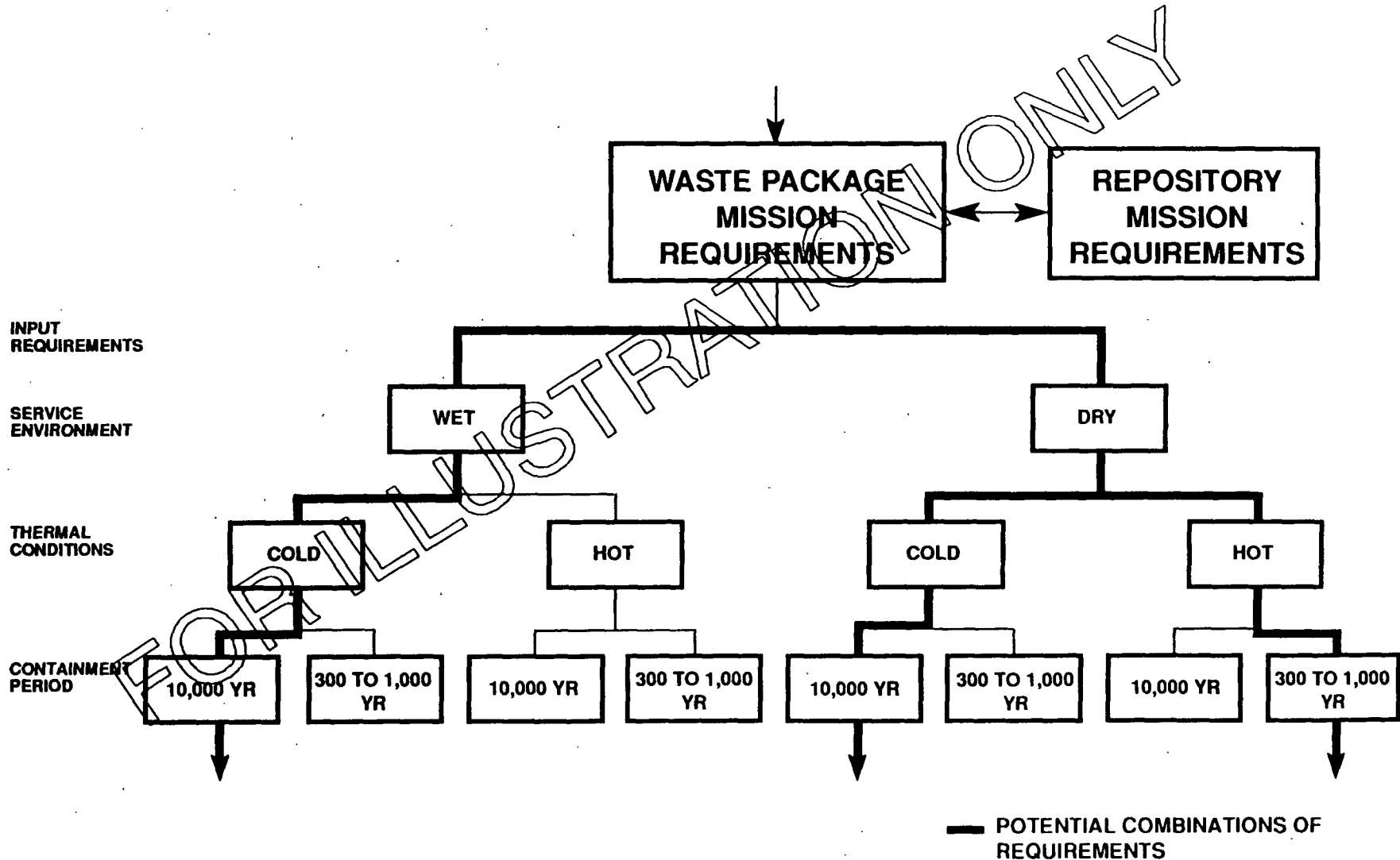
FLOWDOWN OF WASTE PACKAGE DESIGN REQUIREMENTS



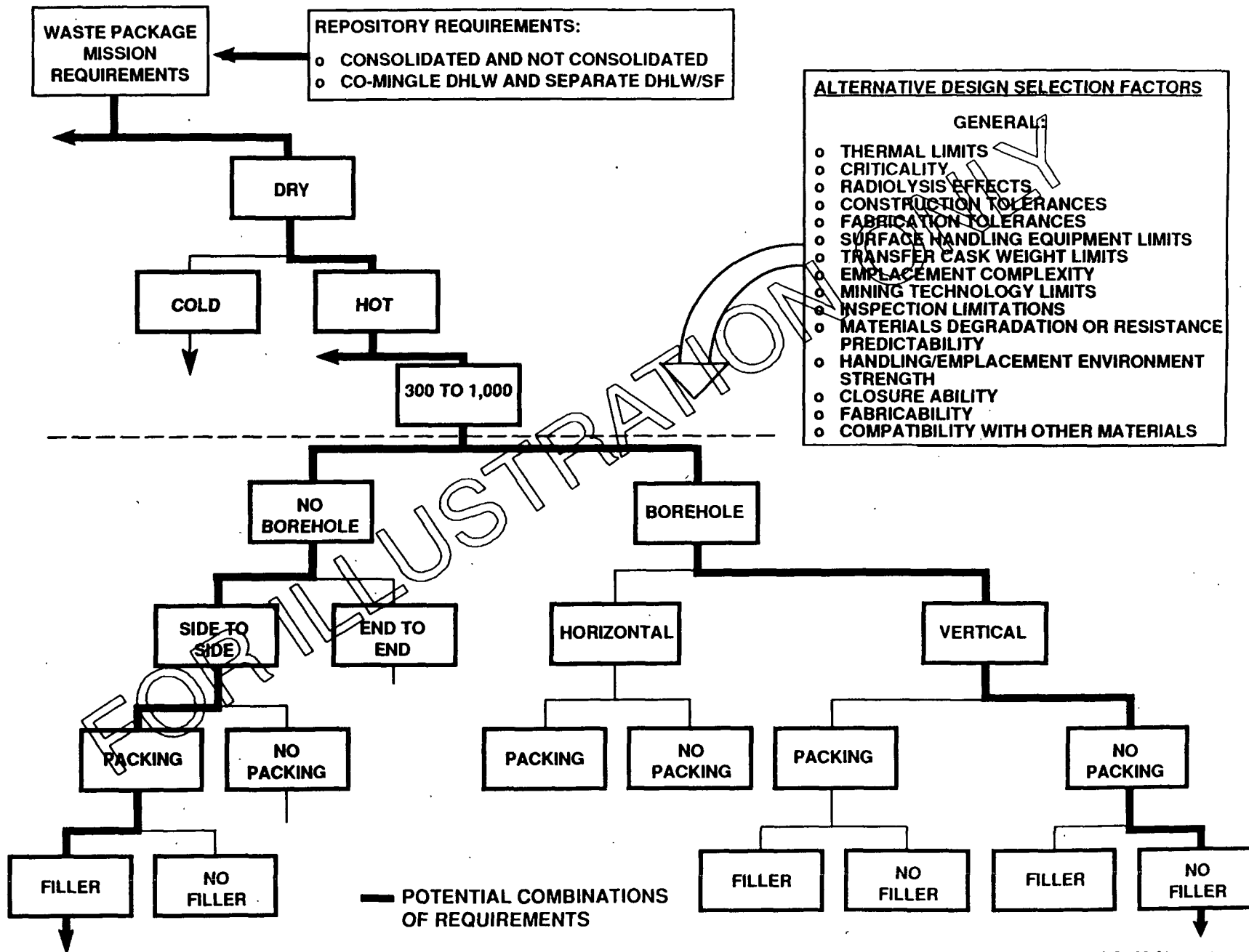
REMARKS ON REQUIREMENTS ANALYSIS (STEP C)

- **REQUIREMENTS CAN BE VIEWED AS A HIERARCHY**
- **REQUIREMENTS CAN BE CLASSIFIED AS TWO TYPES:**
 - **PROGRAMMATIC/POLICY**
 - **TECHNICAL**
- **SELECTIONS OF ALTERNATIVE REQUIREMENTS
MUST BE MADE TO DEVELOP DESIGNS**
- **DOCUMENTATION AND FLOW-DOWN TRACEABILITY
IS A MUST**

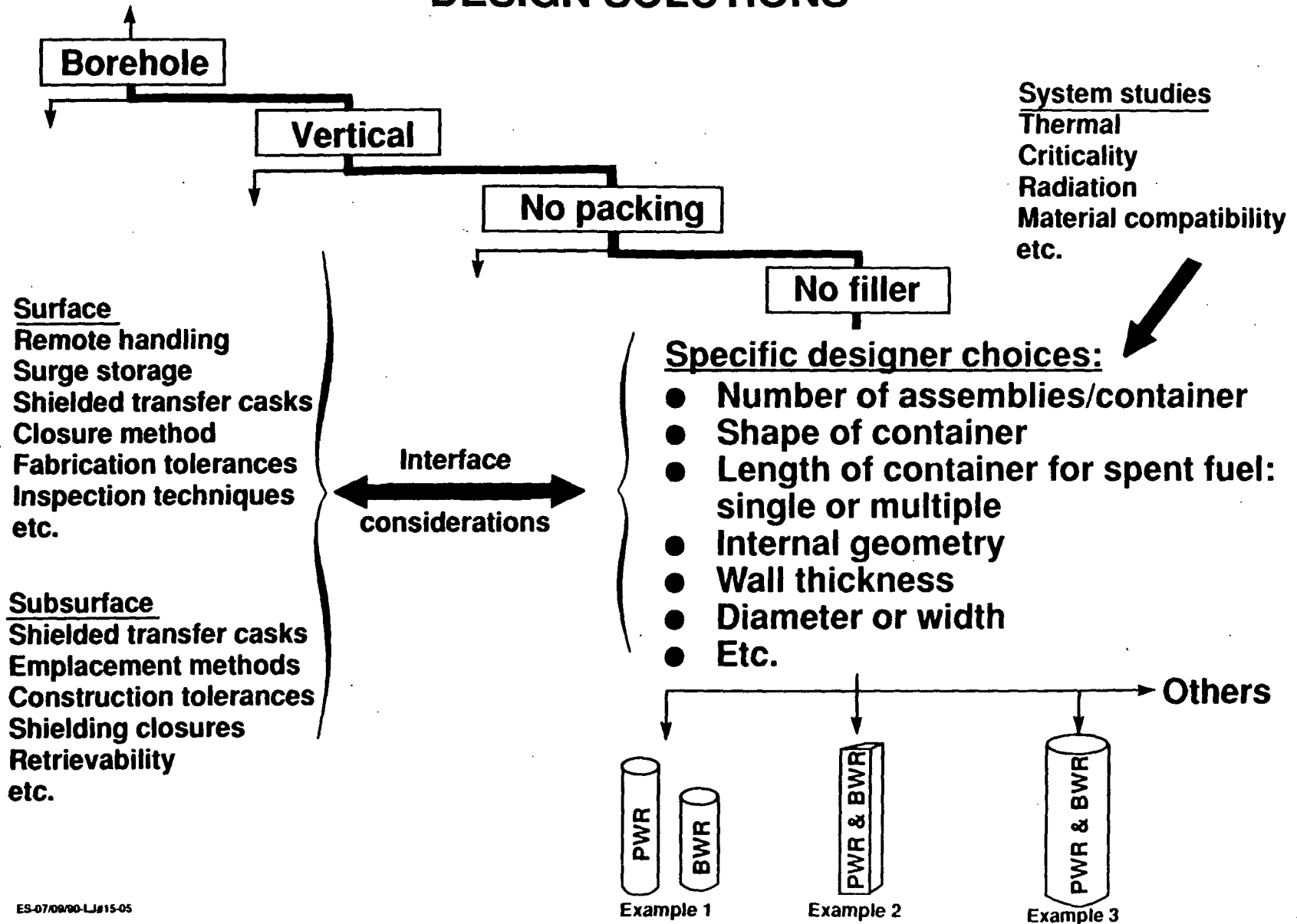
REQUIREMENTS HIERARCHY UPPER TIER



REQUIREMENTS HIERARCHY: MIDDLE TIER (TYPICAL)



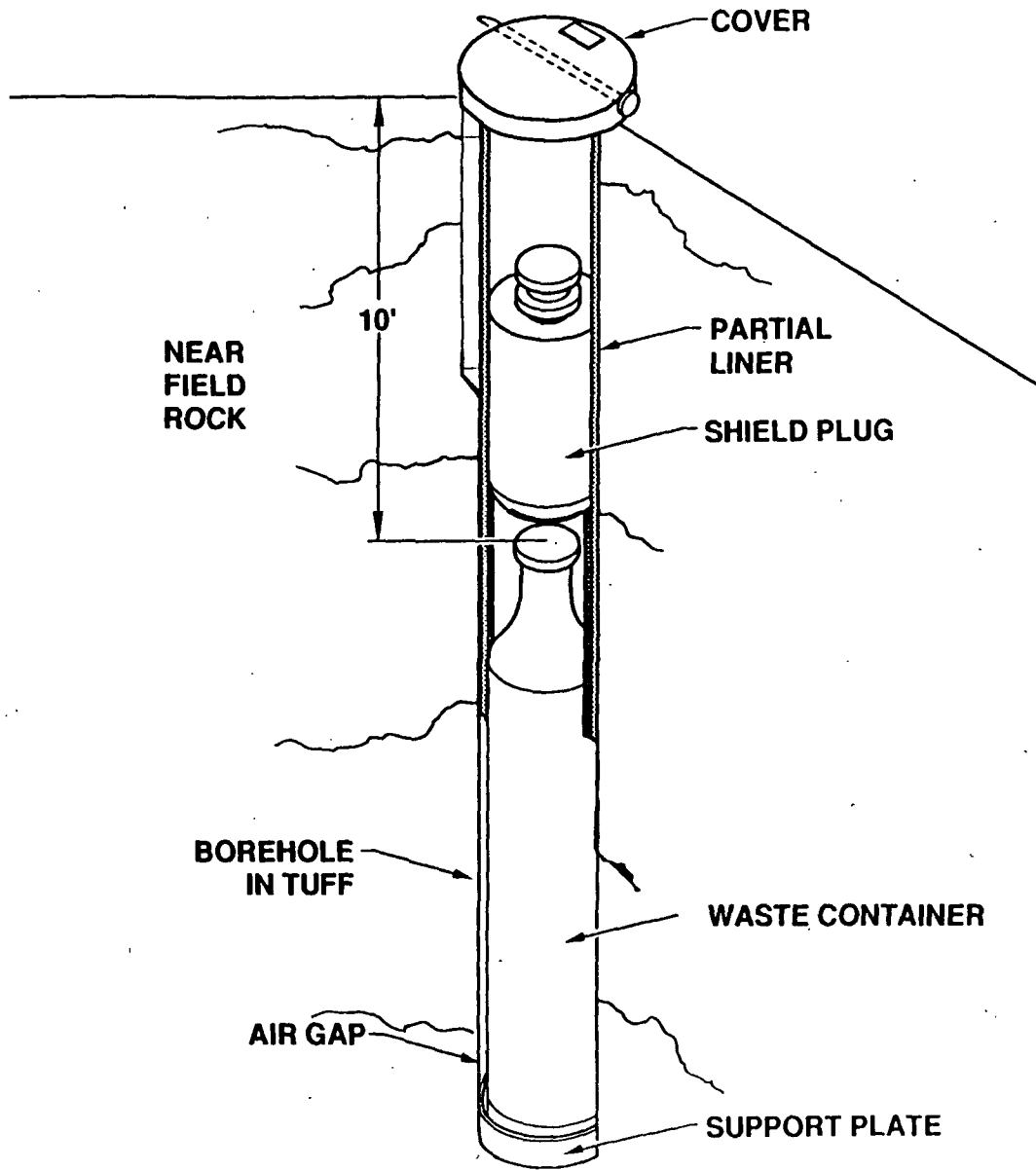
TYPICAL INTERFACES AND LOWER TIER DESIGNER REQUIREMENTS LEAD TO DIFFERENT ACCEPTABLE DESIGN SOLUTIONS



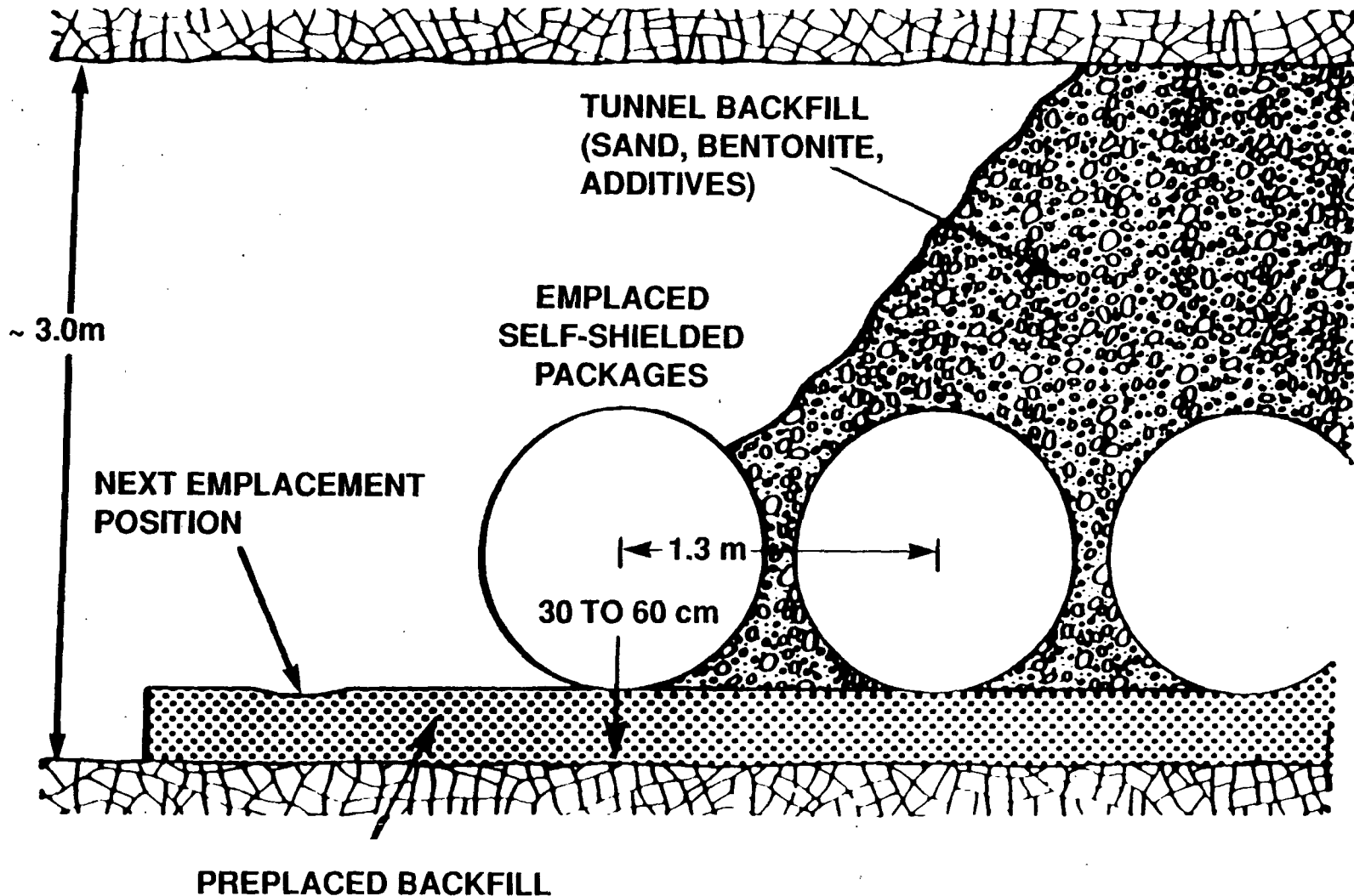
WASTE PACKAGE DESIGN CONCEPTS GENERATED BY THE PROCESS

- **REFERENCE IN SCP**
- **SELF-SHIELDED CONCEPTS**
- **PACKING CONCEPTS**
- **OTHERS**

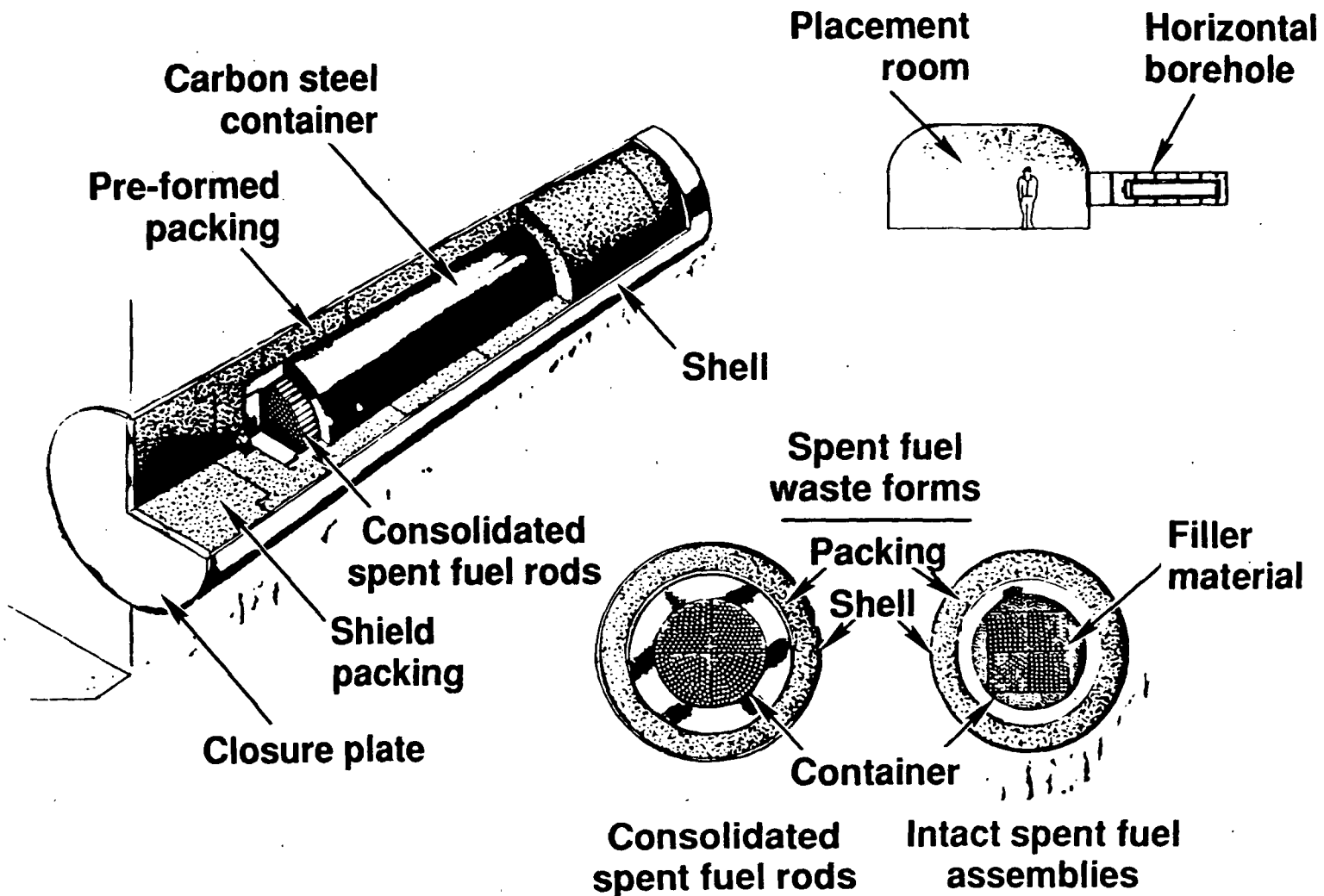
REFERENCE CONFIGURATION FOR VERTICAL EMPLACEMENT



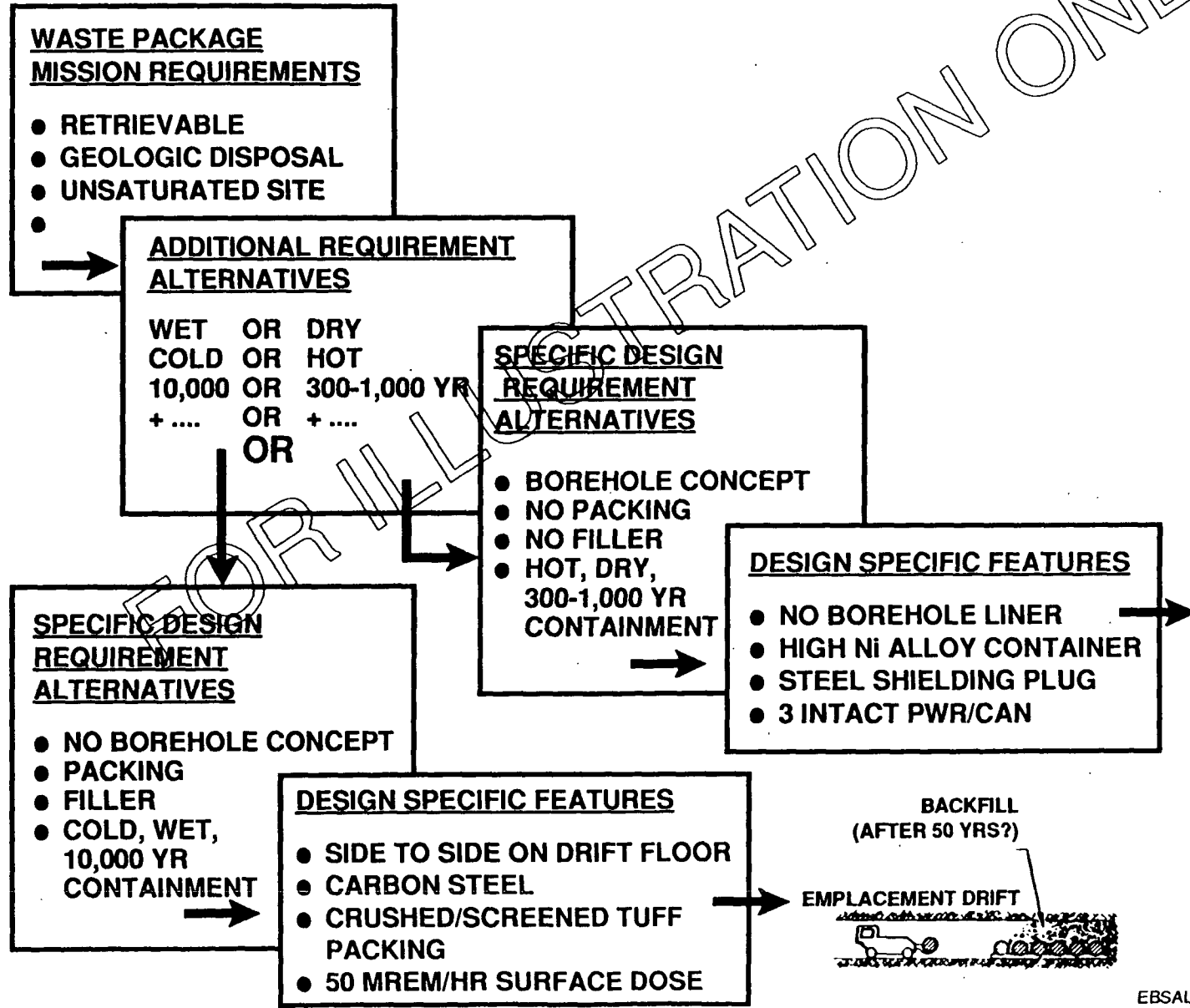
POSSIBLE EMPLACEMENT CONFIGURATION FOR SELF-SHIELDED WASTE PACKAGE DESIGN CONCEPT



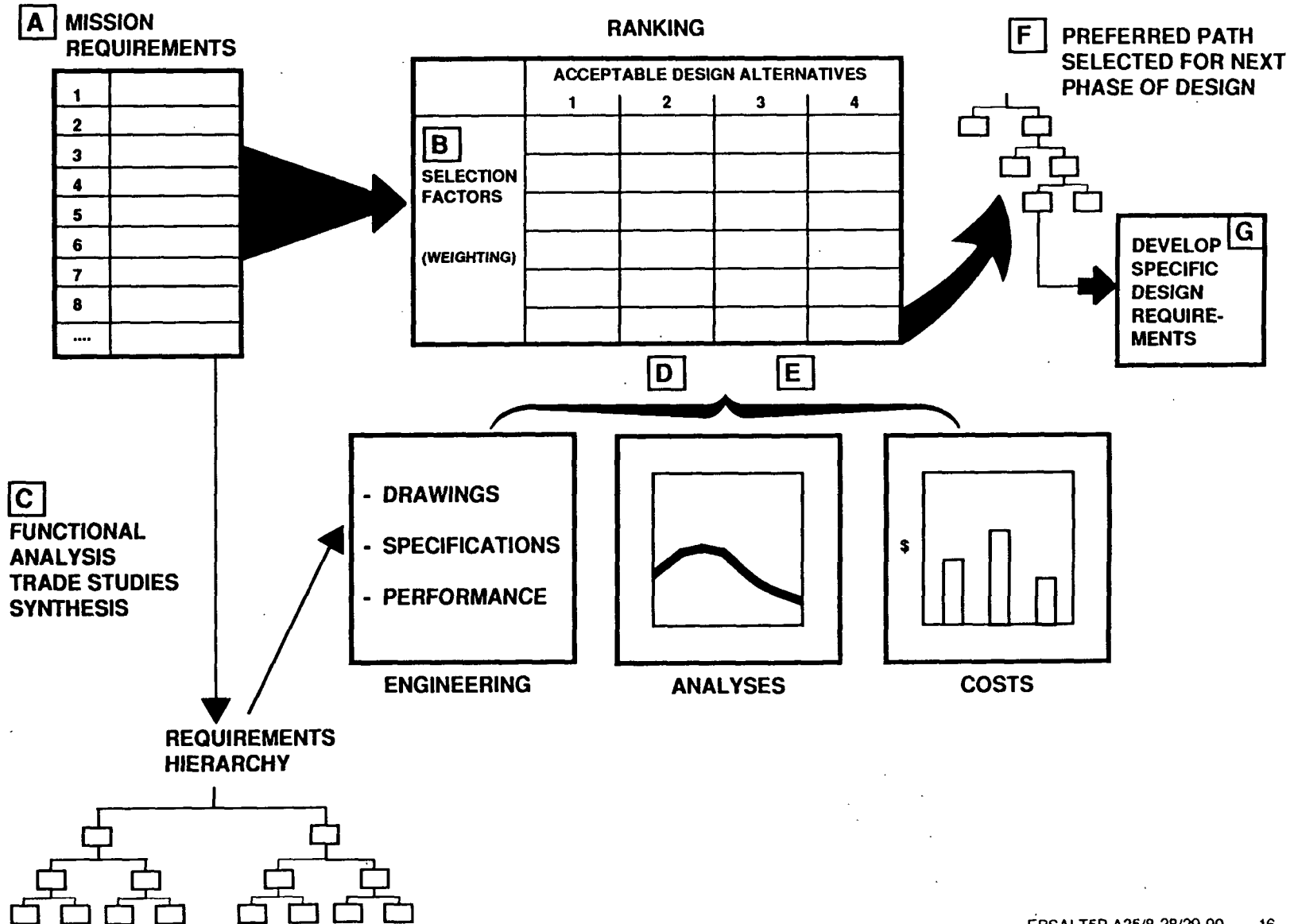
POSSIBLE WASTE PACKAGE HORIZONTAL BOREHOLE DESIGN CONCEPTS



FLOWDOWN AND TRACEABILITY FOR SOURCE OF REQUIREMENTS FOR WASTE PACKAGE DESIGN ALTERNATIVES MUST BE DONE



DESIGN REQUIREMENTS PROCESS



SUMMARY

- **IMPLEMENTATION OF PROCESS HAS BEEN INITIATED**
- **MISSION REQUIREMENTS AND SELECTION FACTORS ARE NOW BEING FORMULATED**
- **REQUIREMENTS ANALYSIS IS TO BE INITIATED**
- **SPECIAL ATTENTION WILL BE GIVEN TO DEVELOPMENT OF DOCUMENTATION FOR PROCESS TO ENSURE TRACEABILITY**
- **METHODOLOGY FOR SELECTION AND RANKING OF ACCEPTABLE DESIGN SOLUTIONS WILL BE DEVELOPED**
- **SPECIFIC DESIGN REQUIREMENTS WILL BE DEVELOPED FOR A FEW (2-4) PREFERRED DESIGNS. THOSE SELECTED WILL BE DEVELOPED FURTHER IN THE NEXT PHASE OF DESIGN (ACD)**