

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

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

**SUBJECT: OVERVIEW OF  
ESF ALTERNATIVES STUDY**

**PRESENTER: DR. THOMAS O. HUNTER**

**PRESENTER'S TITLE  
AND ORGANIZATION: TECHNICAL PROJECT OFFICER  
SANDIA NATIONAL LABORATORIES**

**PRESENTER'S  
TELEPHONE NUMBER: (505) 844-9160**

**JULY 24-25, 1990**

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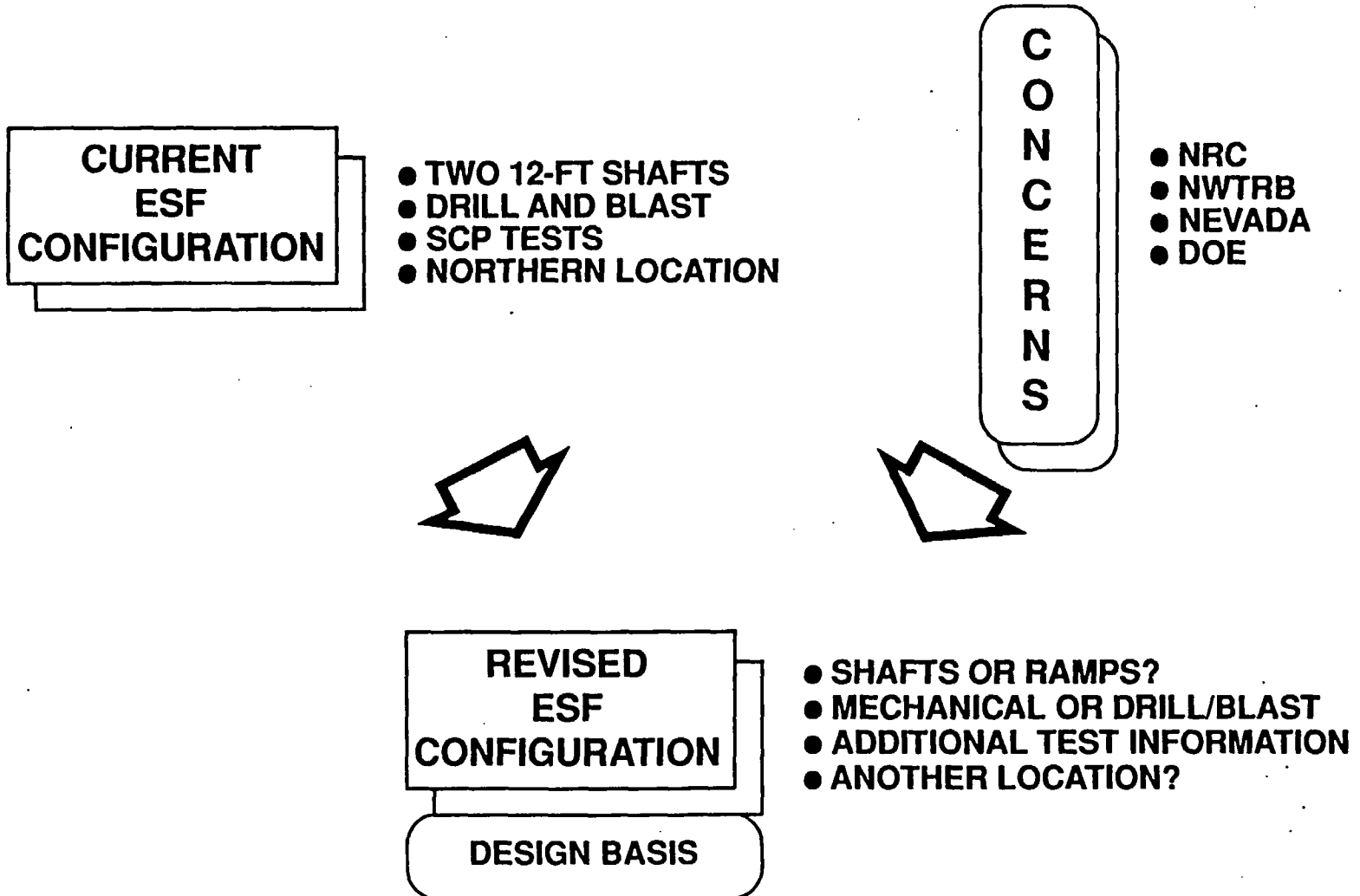
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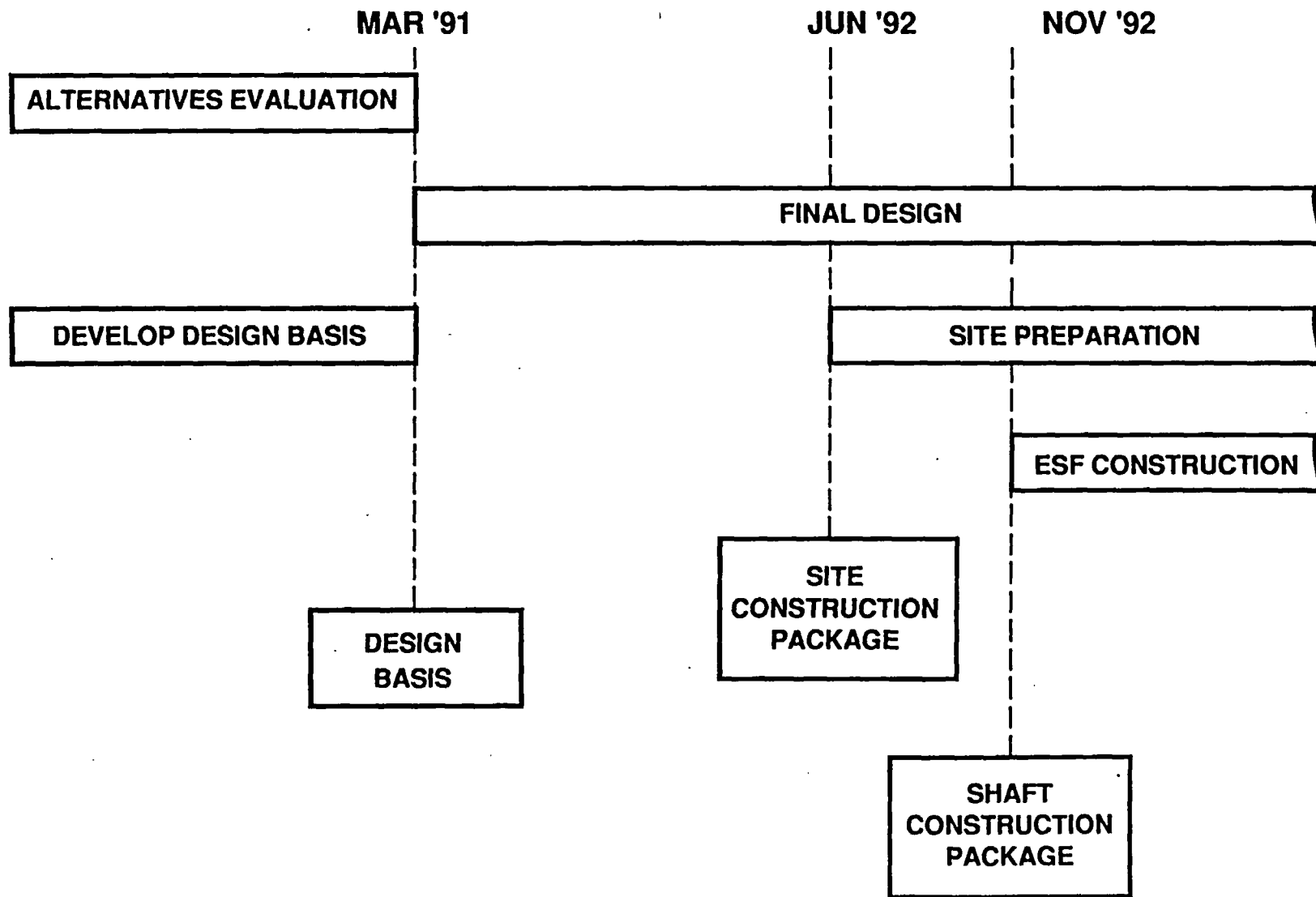
# PRESENTATION OF INFORMATION

- **OVERVIEW OF ESF ALTERNATIVES STUDY**      **TOM HUNTER**
- **OPTIONS AND SUPPORTING INFORMATION**      **AL STEVENS**
- **METHODOLOGY DEVELOPMENT AND PILOT STUDY**      **LEE MERKHOFFER**
- **METHODOLOGY IMPLEMENTATION AND CURRENT STATUS**      **PAUL GNIRK**

# ESF ALTERNATIVES STUDY

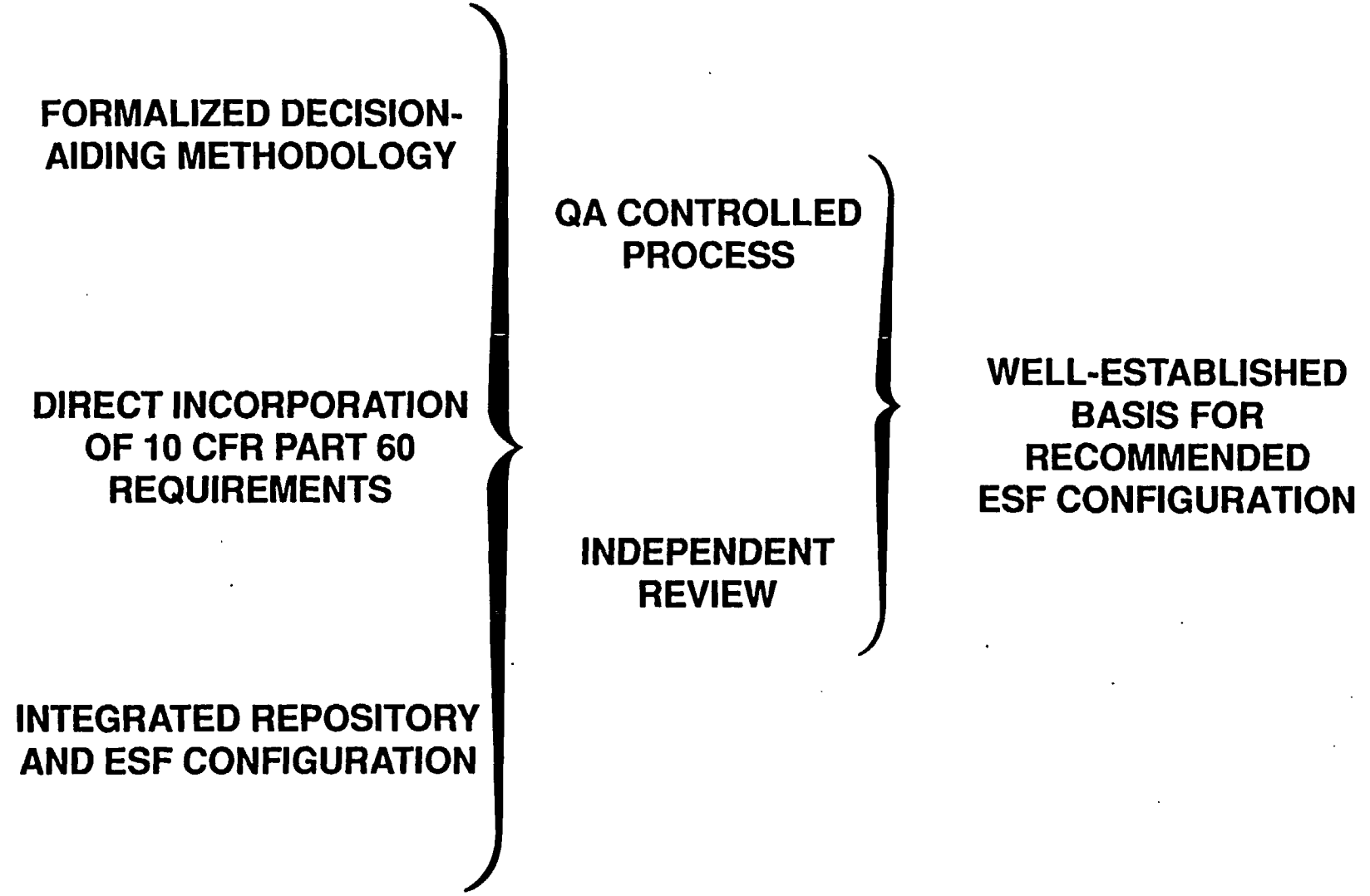


# ESF EVALUATION AND DESIGN

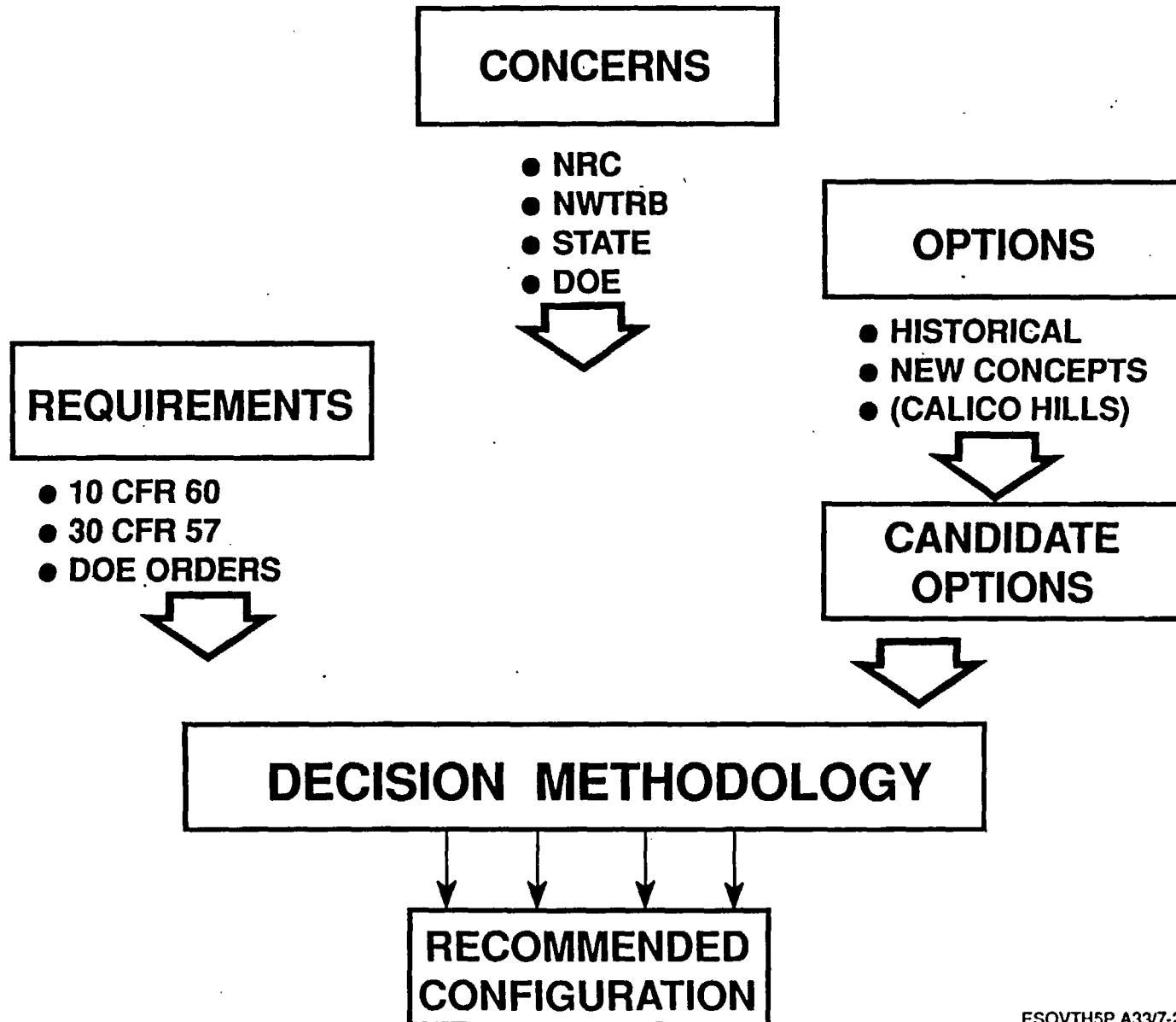


**HOW WILL THE REVISED  
CONFIGURATION  
BE ESTABLISHED?**

# ELEMENTS OF THE DECISION PROCESS

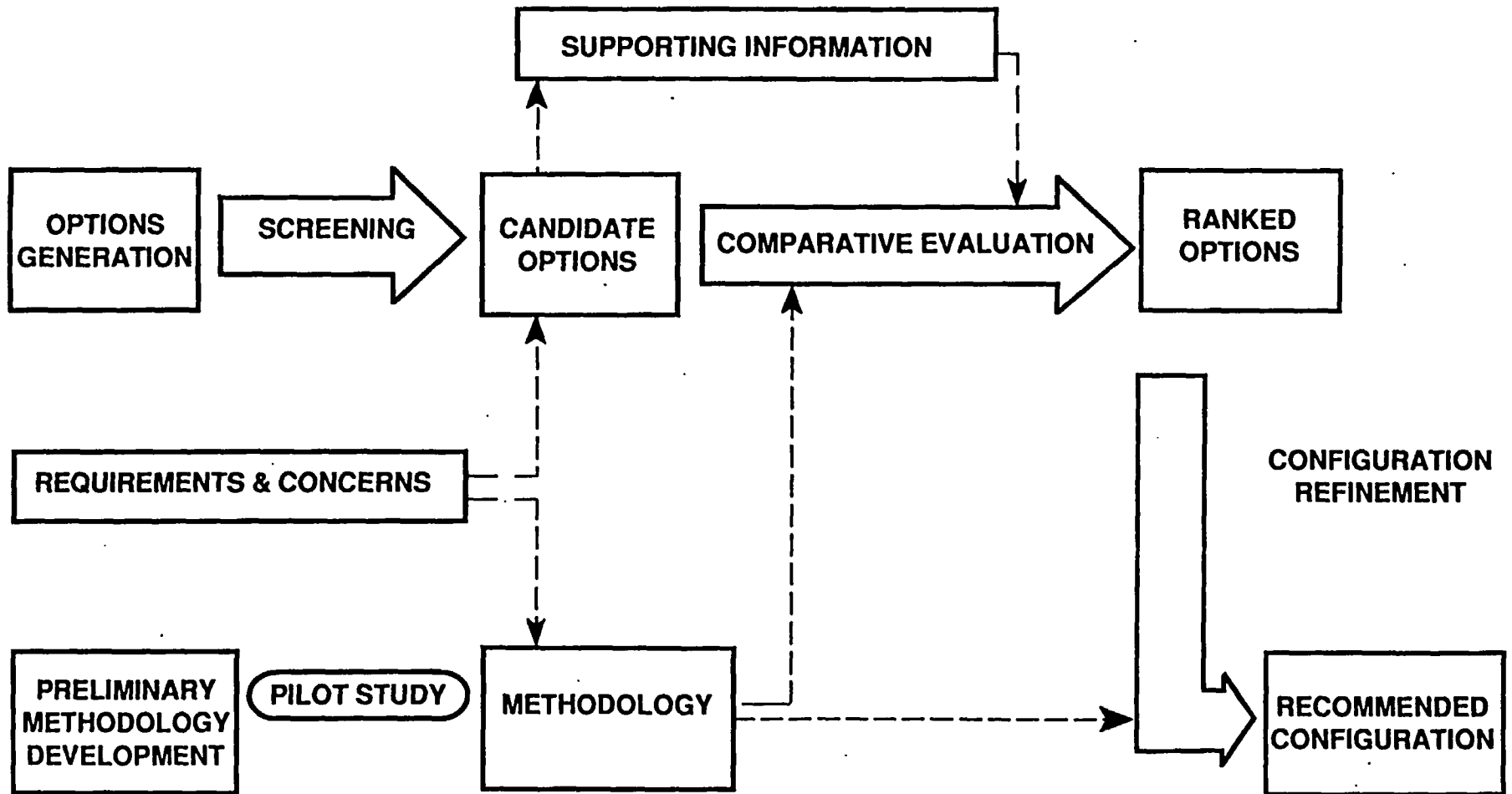


# FRAMEWORK FOR STUDY





# ESF ALTERNATIVES STUDY



# OPTIONS IDENTIFIED

- **52 OPTIONS IDENTIFIED FOR SCREENING**
  - ADDRESS GOALS TO RESOLVE CONCERNS
  - SCREENING BASED ON REQUIREMENTS
  - CONSISTENT WITH OBJECTIVES
- **21 OPTIONS DID NOT PASS MINIMUM (8) SCREENING CRITERIA**
- **REMAINING 31 DIVIDED INTO 12 CLASSES**
- **12 REPRESENTATIVE OPTIONS DEVELOPED IN ADDITION TO BASE CASE**
- **TOTAL OF 17 FINAL AFTER EXPANDING ONE TO FIVE**
  - SPAN THE "SPACE" OF POSSIBLE FEATURES

# SUMMARY OF ESF OPTIONS

## ESF ACCESSSES 1 & 2

### TYPE

- 12' SHAFT
- 16' SHAFT
- 25' RAMP

### CONSTRUCTION METHOD

- DRILL & BLAST
- TUNNEL BORING MACHINE
- SURFACE BORING MACHINE
- V MOLE
- BLIND BORE
- RAISE BORE

## MAIN TEST LEVEL

### LAYOUT

- TITLE II GENERAL ARRANGEMENT
- MODIFIED TITLE II
- TWO LEVEL

### CONSTRUCTION METHOD

- MECHANICAL
- DRILL & BLAST

### LOCATION

- NE
- S

## REPOSITORY

### ESF PLUS:

- ADDITIONAL SHAFTS/RAMPS
- EMPLACEMENT AREA

### POSSIBLE CONSTRUCTION METHOD

- TUNNEL BORING MACHINE
  - RAMPS
  - DRIFTS
  - EMPL. AREA
- DRILL & BLAST
  - EMPL. AREA

# **ESF ALTERNATIVES STUDY PARTICIPANTS**

- **OVERALL MANAGEMENT**
  - SANDIA NATIONAL LABORATORIES (SNL)
- **REQUIREMENTS DEVELOPMENT**
  - TECHNICAL AND MANAGEMENT SUPPORT SERVICES (T&MSS) (SAIC)
- **REPOSITORY DESIGN**
  - PARSONS BRINCKERHOFF, QUADE AND DOUGLAS (PBQD)
- **UNDERGROUND TESTING COORDINATION**
  - LOS ALAMOS NATIONAL LABORATORY (LANL)
  - U.S. GEOLOGICAL SURVEY (USGS)
- **ESF UNDERGROUND DESIGN**
  - FENIX AND SCISSON OF NEVADA (FSN)
- **ESF SURFACE DESIGN**
  - HOLMES AND NARVER (H&N)
- **CONSTRUCTABILITY EVALUATION**
  - REYNOLDS ELECTRICAL AND ENGINEERING COMPANY (REEC<sub>o</sub>)

# ADDITIONAL ORGANIZATIONS USED IN THE STUDY

- DEVELOPMENT AND APPLICATION OF DECISION- AIDING METHODOLOGY
  - RE/SPEC
  - APPLIED DECISION ANALYSIS (ADA),
- EXPERT PANEL MEMBERS ARE DRAWN FROM ESF ALTERNATIVES STUDY PARTICIPANTS AND FROM THE FOLLOWING ADDITIONAL ORGANIZATIONS:

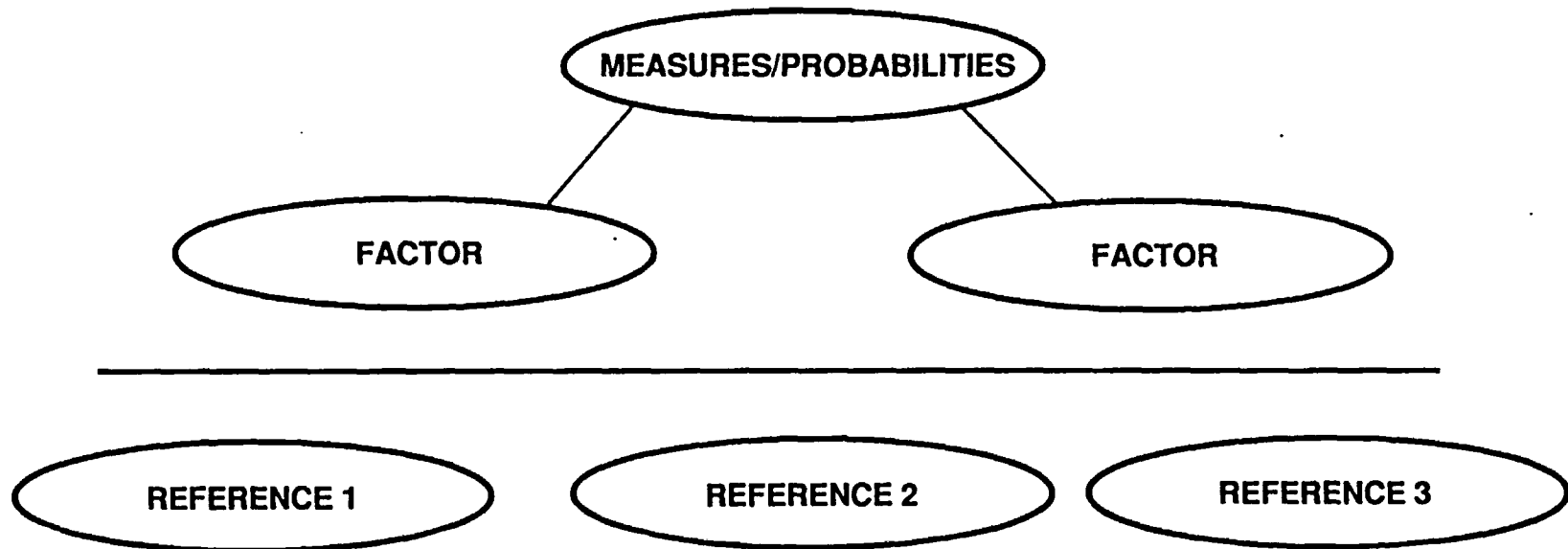
## ORGANIZATIONS

AGIPITO AND ASSOCIATES  
BECHTEL  
DESERT RESEARCH INSTITUTE  
EG&G  
LAWRENCE LIVERMORE LAB.  
ROY F. WESTON  
U.S. BUREAU OF RECLAMATION  
U.S. GEOLOGICAL SURVEY

## PANELS

POSTCLOSURE HEALTH & SAFETY  
PRECLOSURE RADIOLOGICAL HEALTH  
& SAFETY  
PRECLOSURE NON-RADIOLOGICAL  
HEALTH & SAFETY  
ENVIRONMENT  
SOCIOECONOMICS  
COST & SCHEDULE  
CHARACTERIZATION TESTING  
REGULATORY APPROVAL

# PERFORMANCE MEASURES AND PROBABILITIES USED IN DECISION METHODOLOGY ARE SUPPORTED BY REFERENCE INFORMATION



- **ASSESSMENT OF OPTIONS**
  - **COST / SCHEDULE ESTIMATES**
  - **TEST COMPATIBILITY**
  - **OPERATIONAL EVALUATIONS**
- **PERFORMANCE EVALUATIONS OF FEATURES**
- **CORRELATION OF REQUIREMENTS**

# **RECOMMENDED CONFIGURATION CAN BE DEVELOPED FROM RESULTS**

**RANKING**

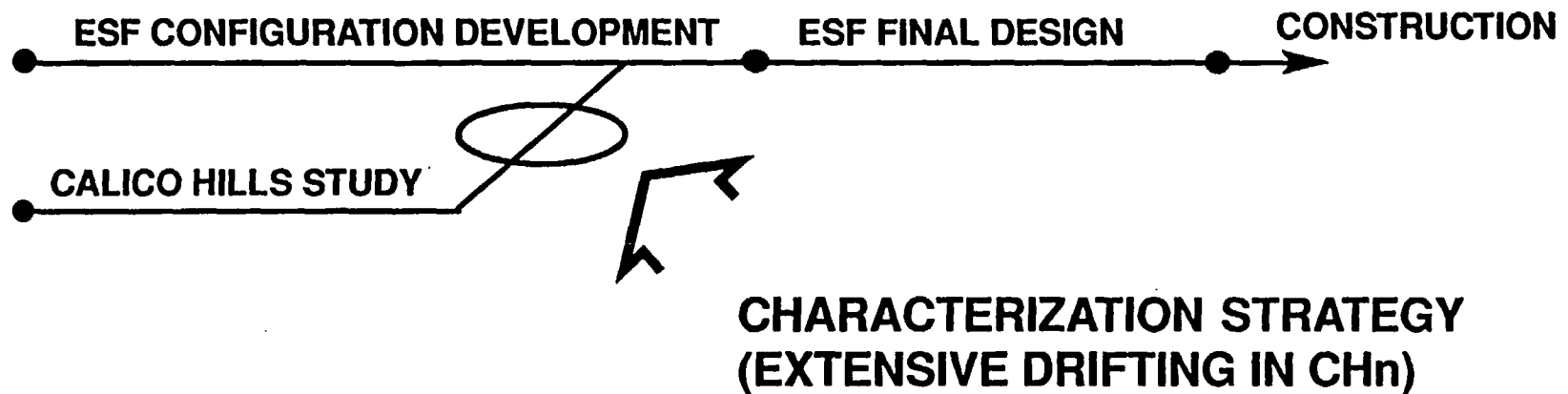
**IMPORTANT FACTORS**

**KEY FEATURES**



**RECOMMENDED  
CONFIGURATION**

# INTERACTION WITH CALICO HILLS STUDY



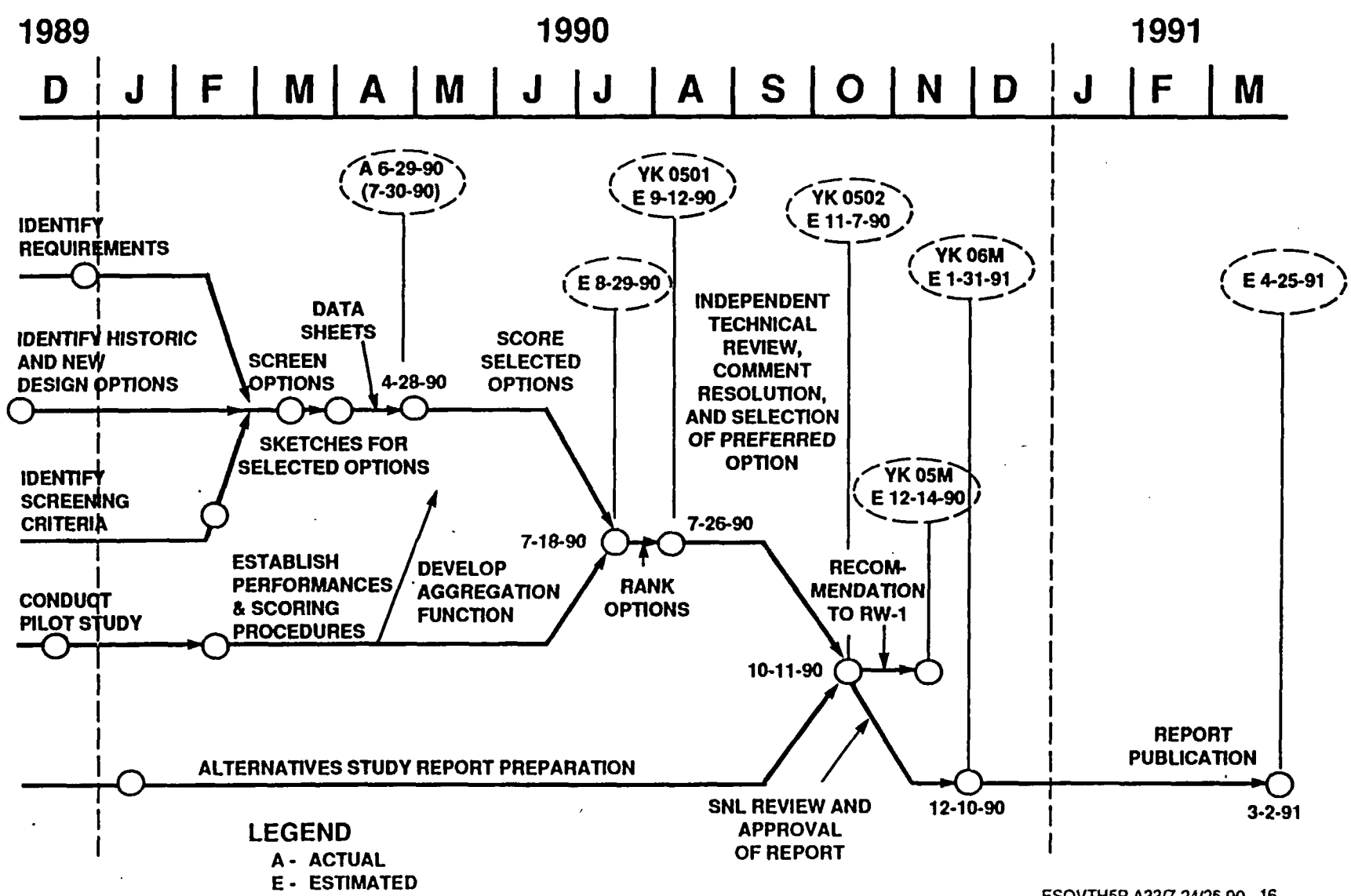
**ESF STUDY COMBINES THE CALICO HILLS STRATEGY WITH OPTIONS AND EVALUATES THE EFFECTIVENESS OF THE COMBINATION IN CHARACTERIZING THE SITE TO SUPPORT LICENSING**



# **TIE BETWEEN ESF CONFIGURATION AND REPOSITORY**

- **OPTIONS EVALUATED IN THE ESF STUDY INCLUDE BOTH ESF AND REPOSITORY CONFIGURATIONS**
  - **ALLOWS FOR A MORE COMPREHENSIVE AND ACCURATE ESTIMATE OF IMPORTANT MEASURES**
  - **PROVIDES FOR EVALUATING A SYSTEM MEETING REGULATORY AND PERFORMANCE REQUIREMENTS (e.g., TOTAL # OF OPENINGS)**
  - **PROVIDES AN ESF WHICH DOES NOT PRECLUDE SUBSEQUENT REPOSITORY DEVELOPMENT**
  
- **HOWEVER, FINAL REPOSITORY CONFIGURATION MAY DIFFER AFTER SITE CHARACTERIZATION AND REPOSITORY DESIGNS ARE COMPLETE**
  - **ESF CONFIGURATION ONLY CONSTRAINS THE REPOSITORY TO THE EXTENT THE REPOSITORY MUST ACCOMMODATE THE CONSTRUCTED FACILITY**
  
- **SPECIAL PERFORMANCE MEASURES ARE DEFINED TO SEPARATE ESF AND REPOSITORY IMPACTS**

# SUMMARY PLANNING NETWORK FOR THE ESF ALTERNATIVES STUDY



# ESF ALTERNATIVES STUDY

