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

PRESENTATION TO THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

SUBJECT: SYSTEMS SYSTEMS ENGINEERING APPROACH & TRANSPORTATION CASK SUBSYSTEM

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AUGUST 21, 1989

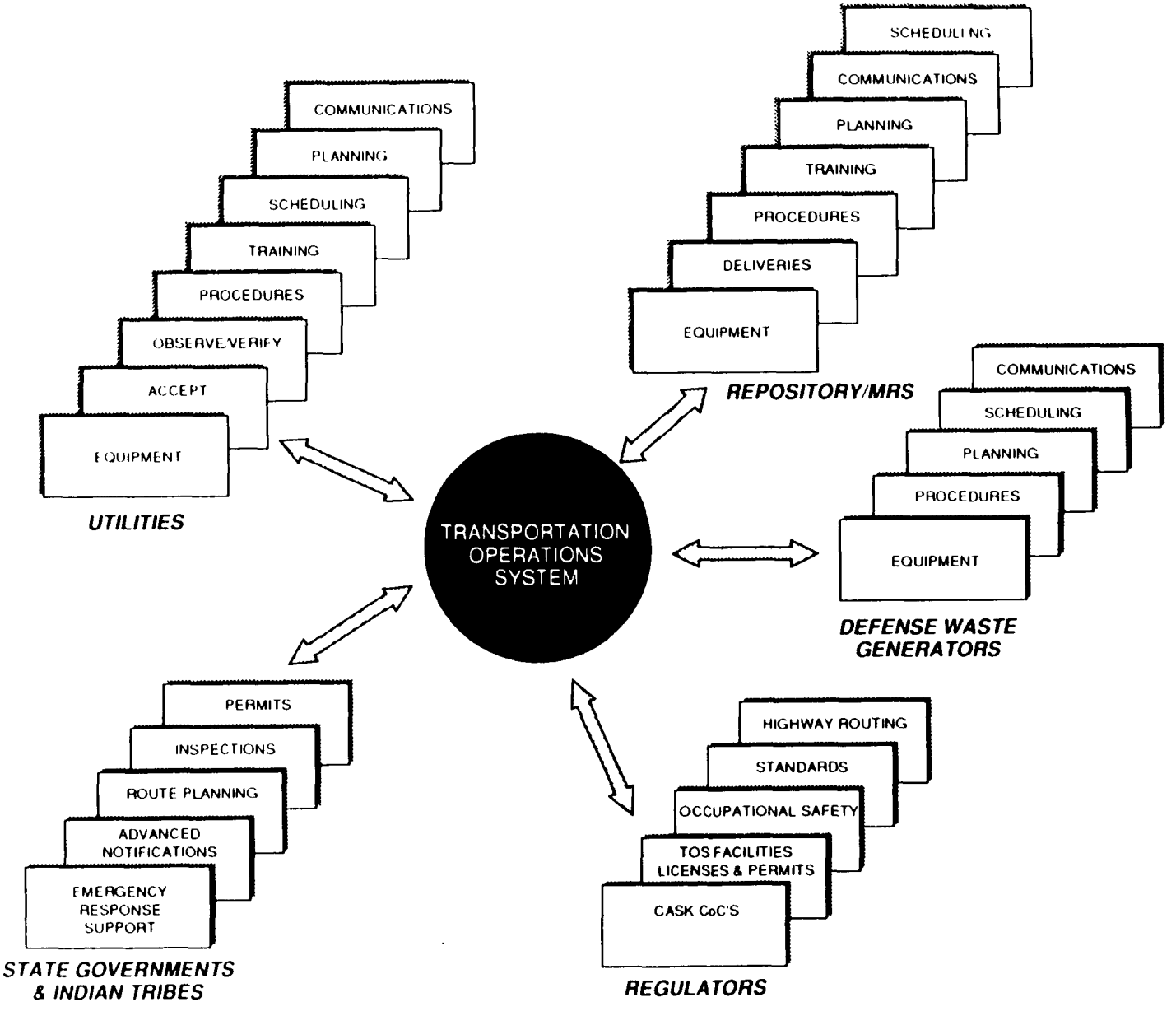
TRANSPORTATION OPERATIONAL PLANNING

- SYSTEM ENGINEERING
- PLANNING AND CONTROL SUBSYSTEM

OPERATIONS INTERFACE WITH CASK SYSTEM DEVELOPMENT

- TRANSPORTATION CASK SUBSYSTEM
- CARRIAGE SUBSYSTEM

MK1
8/21/89



TRANSPORTATION OPERATIONS INTERACTS AT DEPTH WITH OTHER AUTHORITIES

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SYSTEMS ENGINEERING APPROACH IDENTIFICATION, DESCRIPTION, ALLOCATION OF FUNCTIONS

FUNCTIONAL REQUIREMENTS

- OPERATIONAL EXPERIENCE ASSESSMENTS
- FUNCTIONAL REQUIREMENTS AND DESCRIPTIONS

REQUIREMENTS ALLOCATION

- MANAGEMENT STRUCTURE
- FEASIBILITY STUDIES
- ISSUES RESOLUTION

TECHNICAL REQUIREMENTS

- FLEET COMPOSITION
- FLEET SIZE
- FLEET MAINTENANCE REQUIREMENTS
- RELIABILITY, AVAILABILITY, MAINTAINABILITY
- CASK MAINTENANCE REQUIREMENTS

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RESULTS OF OPERATIONS SYSTEM ENGINEERING

- IDENTIFIED AND DESCRIBED TOP LEVEL FUNCTIONS
  - ACCEPT
  - TRANSPORT
  - SUPPORT
- DEFINED LOWER LEVEL SUBFUNCTIONS AND INTERRELATIONSHIPS
- IDENTIFIED SET OF SUBSYSTEMS
- INITIATED PROCESS TO IDENTIFY ISSUES

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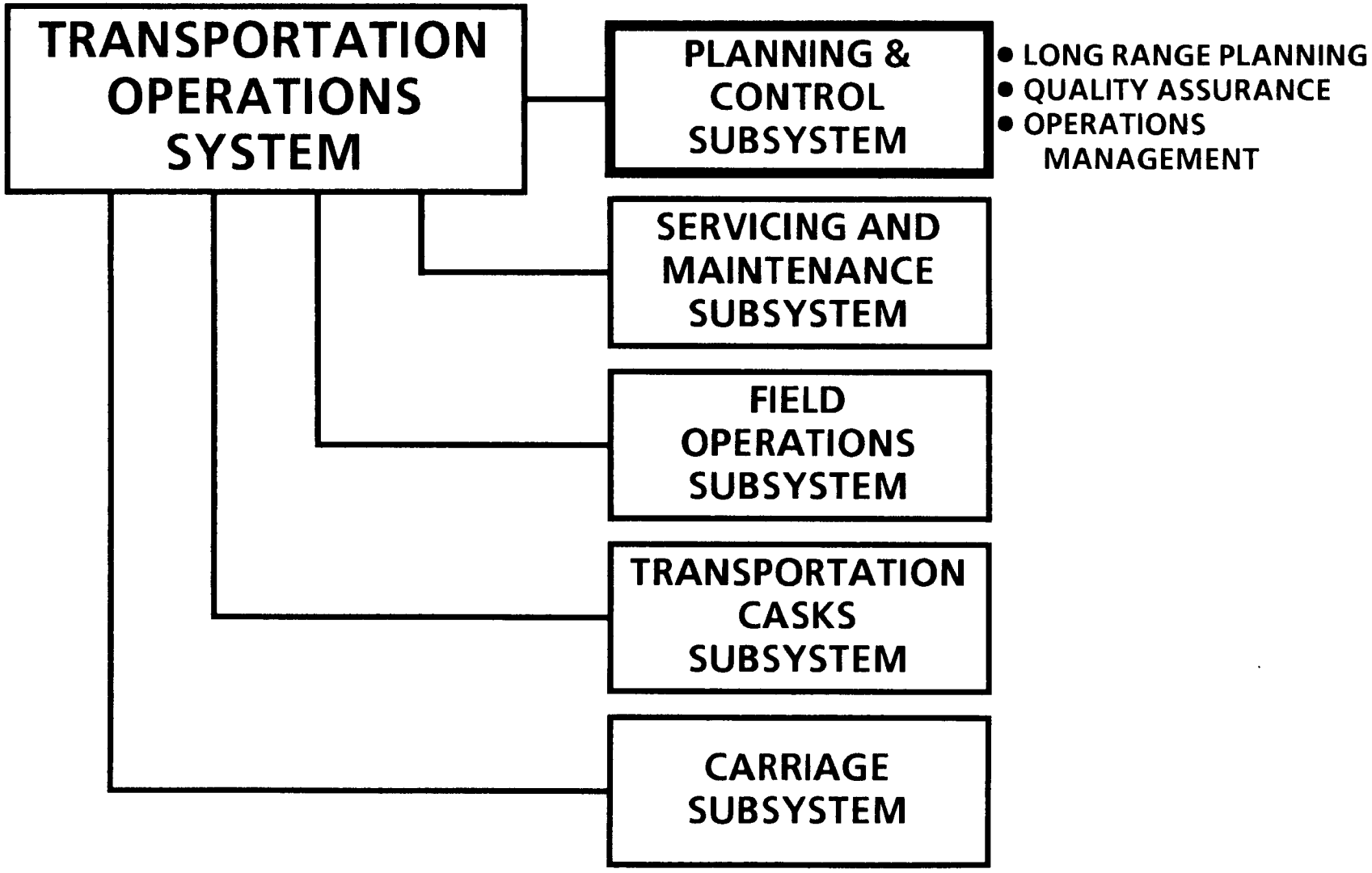
THE TRANSPORTATION OPERATIONS SYSTEM ELEMENTS



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LONG RANGE OPERATIONAL PLANNING CONSIDERATIONS

STANDARD UTILITY CONTRACT (10 CFR 961)

- ESTABLISHES THE SHIPMENT SCHEDULE REQUIREMENT
- REQUIRES CASK AND SUPPORT EQUIPMENT SUITABLE FOR USE AT THE UTILITY'S SITE
- REQUIRES APPROPRIATE DOCUMENTATION AND TRAINING TO UTILITIES

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LONG RANGE OPERATIONAL PLANNING FRAMEWORK

PURPOSE

- DEFINE OPERATIONAL SYSTEM REQUIREMENTS

METHODOLOGY

- SPECIFY ASSUMPTIONS
- SCREEN UTILITY PICK UP OPTIONS
- IDENTIFY FEASIBLE SCENARIOS
- ITERATE THE PROCESS

ISSUES EMERGING FROM CURRENT WORK

- LOGISTICAL COMPLEXITY OF OPERATIONS
  - OVER 80 INDIVIDUAL CUSTOMERS (DOE CONTRACTS)
  - OVER 75 SITE LOCATIONS NATIONWIDE
  - OVER 125 DIFFERENT FACILITIES
  - MANY INFRASTRUCTURES HAVE MODAL CONSTRAINTS
- VARYING REACTORS ACCESS/CASK HANDLING CAPABILITIES VARY WIDELY
- NO U.S. EXPERIENCE WITH LONG-TERM, CONTINUOUS, MULTIPLE SITE CAMPAIGNS FOR SPENT FUEL SHIPMENT
- LOGISTICAL COMPLEXITY CONSIDERATIONS AFFECT NUMBER OF SITES SHIPPING AT ANY ONE TIME

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ISSUE RESOLUTION ACTIVITIES

- DATA ACQUISITION/ANALYSIS
- OVERALL SYSTEM OPERATIONAL PLANNING/INTEGRATION
- DEFINE ALTERNATIVE OPERATIONS SCENARIOS FOR MULTI-SITE CAMPAIGNING BY TIME PERIOD
- USE OPERATING SCENARIOS AS BASIS FOR TOS DEVELOPMENT (EQUIPMENT, FACILITIES, SERVICES, PERSONNEL)
- SITE SPECIFIC REACTOR SERVICING PLANS
- CAMPAIGN PLANNING

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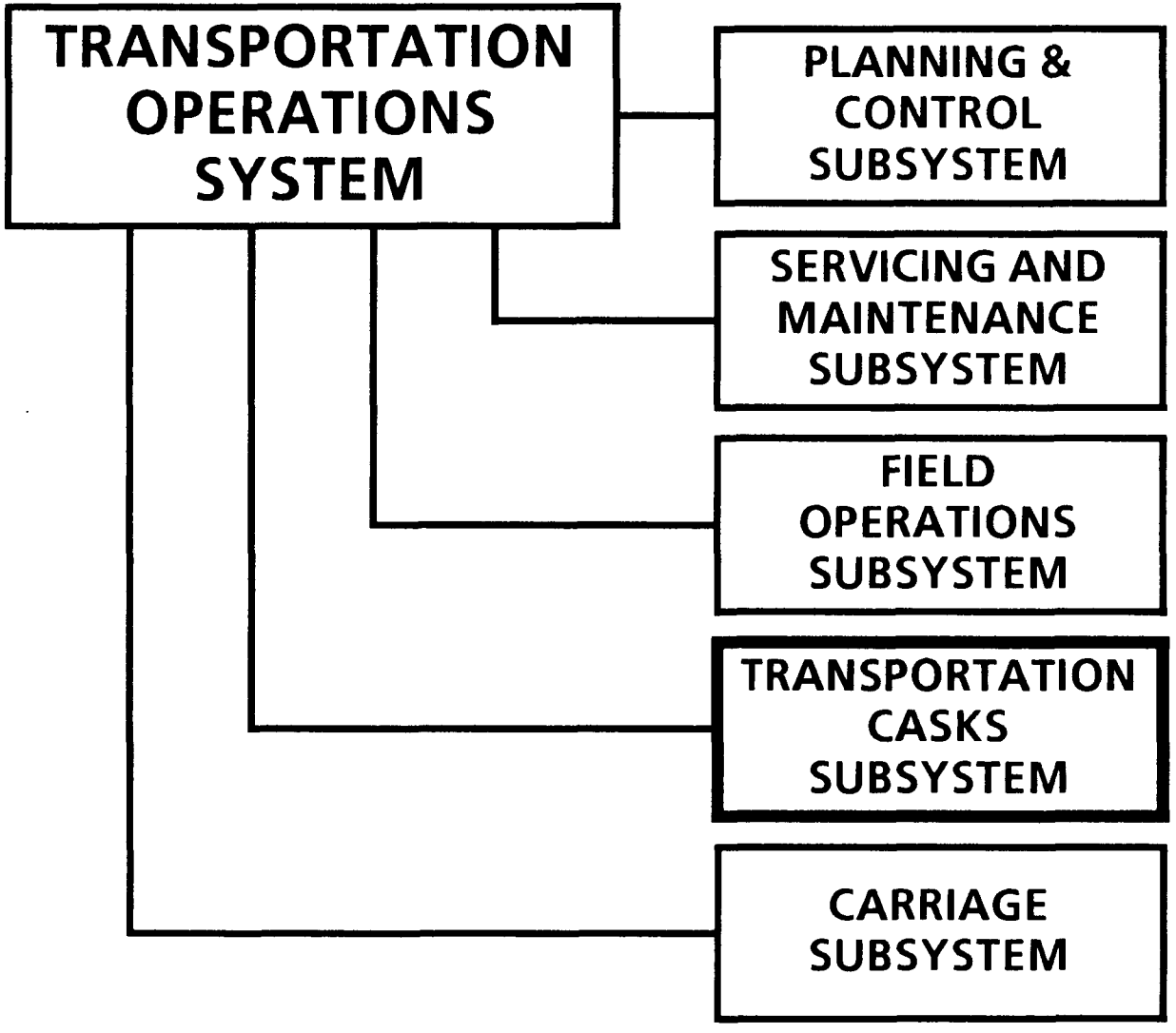
CONCLUSION

- OPERATING SYSTEM IS COMPLEX
- REQUIRE INTEGRATION OF A NUMBER OF ELEMENTS
- SYSTEM ENGINEERING AND PLANNING TO BUILD A LOGISTICALLY SOUND SYSTEM

THE TRANSPORTATION OPERATIONS SYSTEM ELEMENTS



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OPERATIONAL COORDINATION WITH CASK SYSTEM DEVELOPMENT

- CHECKLIST FOR OPERATIONAL REVIEW OF CASK DESIGN
  - CASK DESIGN
  - ANCILLARY EQUIPMENT
  - TRANSPORTER DESIGN
  - INTERMODAL TRANSFER EQUIPMENT
- OVERALL SYSTEM ASSESSMENT
- INPUT FOR FINAL DESIGN PERFORMANCE EVALUATION AND FLEET PROCUREMENT
- OPERATIONAL TESTING

CARRIAGE SUBSYSTEM TRANSPORTER COORDINATION

- TARGET WEIGHTS FOR CASK, TRAILER, AND TRACTOR

  54,000 LB- CASK (INCLUDING PAYLOAD AND IMPACT LIMITERS)

  9,000 LB - TRAILER (INCLUDING TIEDOWN AND PERSONNEL BARRIER

  16,000 LB- TRACTOR (WET AND ROAD READY)

- DEVELOPED PRELIMINARY TRACTOR PERFORMANCE CRITERIA AND WEIGHT

- TRADE-OFF STUDIES ON SYSTEM PERFORMANCE VERSUS WEIGHT LIMITS

- DEMONSTRATE SYSTEM USING DUMMY CASK, PROTOTYPE TRAILER, AND PROTOTYPE TRACTOR

MANUFACTURER SPECIFIED BASE TRACTOR

CAB OVER ENGINE
180" WHEEL BASE
CUMMINS 400
FULLER 12609 TRANSMISSION
46" SLEEPER
AIR SUSPENSION
ALUMINUM WHEELS
POWER STEERING
AIR CONDITIONING
ABS
100 GALLON FUEL TANK – ALUMINUM
ALUMINUM BELL HOUSING
ALUMINUM REAR AXLE CARRIER
SLIDING FIFTH WHEEL WITH SAVING OPTION
AIR SEATS – DRIVER AND PASSENGER
15-1/2" CERAMIC CLUTCH
DELUXE INTERIOR

Weight – Approximately 14,500 lbs (dry)

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TRACTOR WEIGHT BREAKDOWN
ROAD READY

	ESTIMATED WEIGHT (LBS.)
BASE TRUCK - MINIMUM ESSENTIAL FEATURES DRY	14,500
FUEL (100 GALLONS)	700
OUTFITTING (DRIVERS, GEAR, TOOLS, ETC.)	1,000
60" SLEEPER	300
EXTRA FUEL TANK	100
206" WHEEL BASE	200
1-1/2 PERCENT VARIANCE	250
	17,050
ALLOWANCE FOR SNOW AND ICE BUILDUP	300
	17,350

MK15
8/21/89

SYSTEM FEATURES AND WEIGHT SAVING OPTIONS FOR TRADEOFF STUDIES

TRACTOR WEIGHT SAVINGS OPTIONS

SMALL BLOCK ENGINE
MIDSIZE SLEEPER
FIXED FIFTH WHEEL
180" WHEEL BASE
ONE FUEL TANK

PROCEDURAL OPTIONS

NO ALLOWANCE FOR ICE BUILDUP
NO CHAINS

OTHERS

SINGLE DRIVER SCENARIOS
INTEGRATED (TRACTOR-TRAILER) TRANSPORTER