PRESENTATION TO
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

SUBJECT: ROUTING

PRESENTER: DR. DAVID S. JOY

PRESENTER'S TITLE AND ORGANIZATION: TECHNICAL MANAGER, WASTE MODELING AND LOGISTICS
OAK RIDGE NATIONAL LABORATORY
OAK RIDGE, TENNESSEE

PRESENTER'S TELEPHONE NUMBER: (615) 576-2068

AUGUST 21, 1989
ROUTING

- REGULATORY FRAMEWORK

- ROUTING MODELS
ROUTING REGULATIONS FOR HIGHWAY
ROUTE-CONTROLLED QUANTITIES OF
RADIOACTIVE MATERIALS

- DEPARTMENT OF TRANSPORTATION 49 CFR PART
  177.825 (HM–164)
  - PREFERRED NETWORK TO REDUCE TIME IN TRANSIT
    - INTERSTATE HIGHWAYS
    - STATE-DESIGNATED ROUTES
  - STATE- OR TRIBAL-DESIGNATED ROUTES
    - DEVELOPED USING DOT GUIDELINES OR “EQUIVALENT ANALYSIS”
    - ROUTES MUST BE REGISTERED WITH DOT
  - CARRIERS SELECT ROUTES PRIOR TO SHIPMENT
  - DOT APPROVAL NOT REQUIRED PRIOR TO SHIPMENT
  - CARRIERS MUST REPORT ACTUAL ROUTE DRIVEN TO DOT WITHIN 30 DAYS

8/21/89
ROUTING REGULATIONS FOR HIGHWAY
ROUTE CONTROLLED QUANTITIES OF
RADIOACTIVE MATERIALS (CONT’D)

- NUCLEAR REGULATORY COMMISSION
  10 CFR PART 73
  - CARRIERS MUST OBTAIN ROUTE APPROVAL
    PRIOR TO SHIPMENT
  - ROUTE SUITABILITY JUDGED WITH RESPECT
    TO SAFEGUARDS
  - UNDER CERTAIN CONDITIONS ESCORTS ARE
    REQUIRED IN URBAN AREAS
REGULATIONS PERTAINING TO THE ROUTING OF RAIL SHIPMENTS OF RADIOACTIVE MATERIALS

- DEPARTMENT OF TRANSPORTATION
  49 CFR PART 174.14
  - NO SPECIFIC ROUTING REGULATIONS

- NUCLEAR REGULATORY COMMISSION
  10 CFR PART 73.37
  - CARRIERS MUST OBTAIN ROUTE APPROVAL PRIOR TO SHIPMENT
  - ROUTE SUITABILITY JUDGED ON SAFEGUARDS
  - ESCORTS REQUIRED
REGULATIONS PERTAINING TO THE ROUTING OF RAIL SHIPMENTS OF RADIOACTIVE MATERIALS (CONT’D)

- DEPARTMENT OF ENERGY ORDERS DOE 1540.4

- NO SPECIFIC ROUTING REGULATIONS

- RAIL ROUTING SHALL GIVE CONSIDERATION TO
  - CLASS OF RAILROAD
  - CLASS OF TRACK
  - REDUCING TIME IN TRANSIT
  - REDUCING TIME AT INTERCHANGE POINTS
  - REDUCING THE NUMBER OF CARRIERS
  - COST OF SERVICE
ROUTING MODEL

• PURPOSE
  
  – TO ESTIMATE PROBABLE ROUTES FOR THE TRANSPORT OF SPENT FUEL AND OTHER RADIOACTIVE WASTES

  – AUXILIARY CAPABILITIES
    • MAPPING
    • CALCULATION OF POPULATION STATISTICS

• HIGHWAY MODELS FOR HIGHWAY TRANSPORTATION ROUTES

• INTERLINE MODELS FOR RAIL AND/OR BARGE ROUTES
HIGHWAY ROUTING DATA BASE

- DESCRIBES OVER 244,000 MILES OF HIGHWAYS IN THE UNITED STATES
  - INTERSTATE HIGHWAYS 43,830 MILES
  - U.S. HIGHWAYS 117,020 MILES
  - OTHER HIGHWAYS 78,959 MILES
  - OTHER 4,385 MILES

- INCLUDES DATA FOR EACH HIGHWAY SEGMENT
  - DISTANCE
  - ESTIMATED DRIVING SPEED

- IDENTIFIES ALL LOCATIONS BY NAME AND GEOGRAPHICAL COORDINATES
  - HIGHWAY INTERSECTIONS (13,500)
  - COMMERCIAL NUCLEAR REACTOR SITES (76)
  - POTENTIAL WASTE MANAGEMENT FACILITY SITES
FEATURES OF THE HIGHWAY ROUTING MODEL

- ESTIMATES SHIPPING PATTERNS USED BY COMMERCIAL CARRIERS
- SIMULATES ROUTES FOR ROUTE–CONTROLLED QUANTITIES OF RADIOACTIVE MATERIALS (INCLUDING SPENT FUEL)
- CALCULATES ALTERNATIVE ROUTES
  - ALTERNATIVE DOT APPROVED ROUTES
  - ROUTES BYPASSING SPECIFIC GEOGRAPHICAL AREAS
ALTERNATIVE HIGHWAY ROUTES FROM CRYSTAL RIVER PLANT, FLORIDA TO HANFORD, WASHINGTON

DJ9
8/21/89
INTERLINE MODEL

• INTERLINE DATA BASE
  – CONTAINS ALL RAILROADS IN THE UNITED STATES EXCEPT INDUSTRIAL SPURS
  – ORIGINAL SOURCE, FEDERAL RAILROAD ADMINISTRATION

• UNIQUE FEATURES OF INTERLINE
  – IDENTIFIES LINE OWNERSHIP
  – IDENTIFIES INTERCHANGE POINTS
  – SIMULATES THE LONG-HAUL ADVANTAGE FOR THE ORIGINATING RAILROAD
  – CALCULATES ALTERNATIVE ROUTES WHEN MULTIPLE OPTIONS EXIST
ALTERNATIVE RAIL ROUTES FROM CRYSTAL RIVER PLANT, FLORIDA TO HANFORD, WASHINGTON

DJ11
8/21/89
FEATURES OF BARGE ROUTING

• NETWORK
  - INLAND WATERWAYS
  - INTERCOASTAL WATERWAYS
  - GREAT LAKES & ST. LAWRENCE SEAWAY
  - PANAMA CANAL

• INTERCHANGE POINTS WITH RAILROAD NETWORK

• AUTOMATIC CALCULATION OF BARGE-RAIL INTERMODAL ROUTES
POPULATION DENSITY DATA

- BASED ON THE 1980 U.S. CENSUS ENUMERATION AREAS OR BLOCK GROUPS

- 12 INDIVIDUAL POPULATION DENSITY GROUPS

- POPULATION DENSITY DISTRIBUTIONS ARE DEFINED FOR EACH LINK IN THE HIGHWAY AND INTERLINE DATA BASES

- COMPATIBLE WITH THE RADTRAN RISK CODE INPUT