



# **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**

# **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

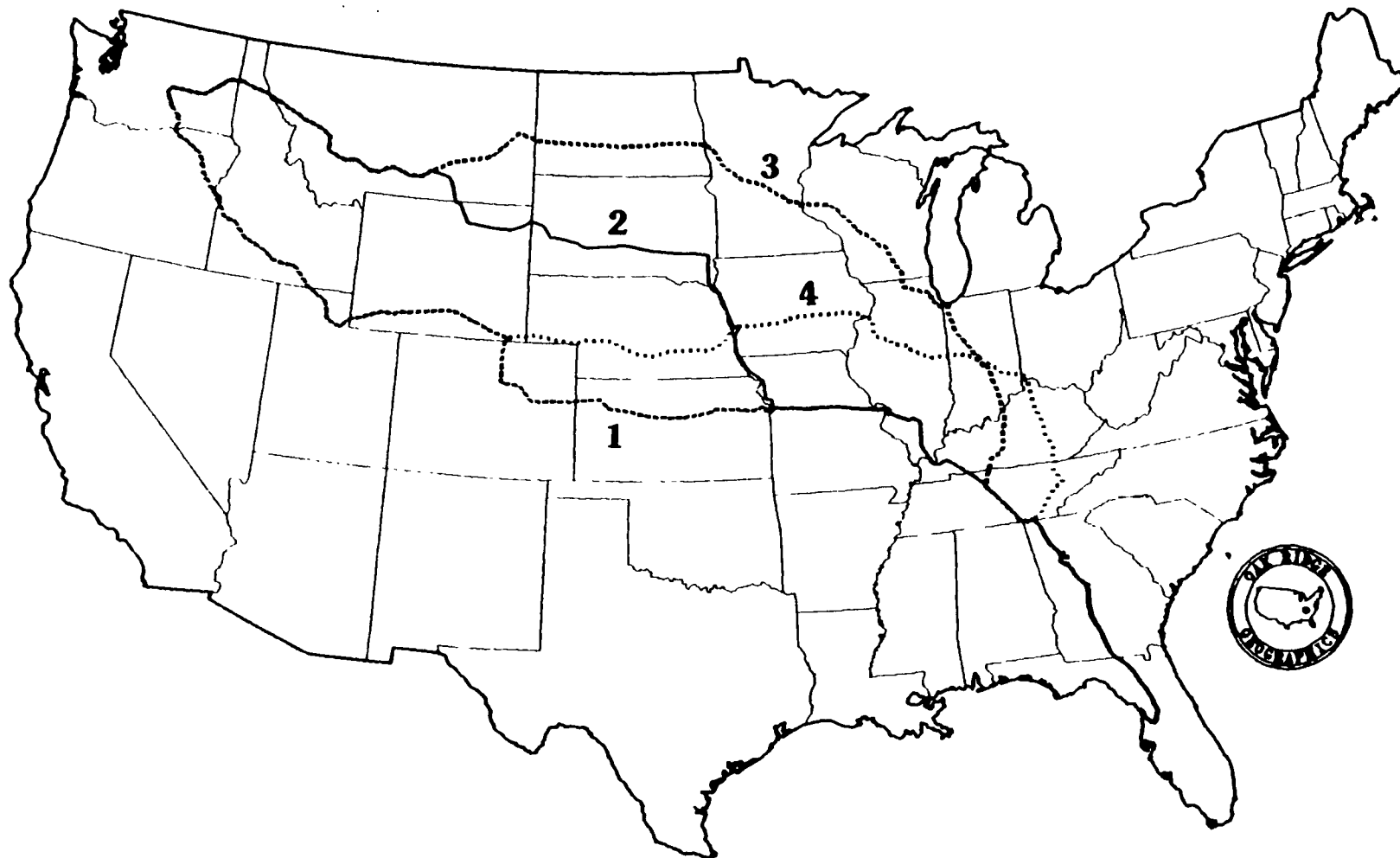
- **DESCRIBES OVER 244,000 MILES OF HIGHWAYS IN THE UNITED STATES**
  - **INTERSTATE HIGHWAYS** 43,830 MILES
  - **U.S. HIGHWAYS** 117,020 MILES
  - **OTHER HIGHWAYS** 78,959 MILES
  - **OTHER** 4,385 MILES
- **INCLUDES DATA FOR EACH HIGHWAY SEGMENT**
  - **DISTANCE**
  - **ESTIMATED DRIVING SPEED**
- **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



## **INTERLINE MODEL**

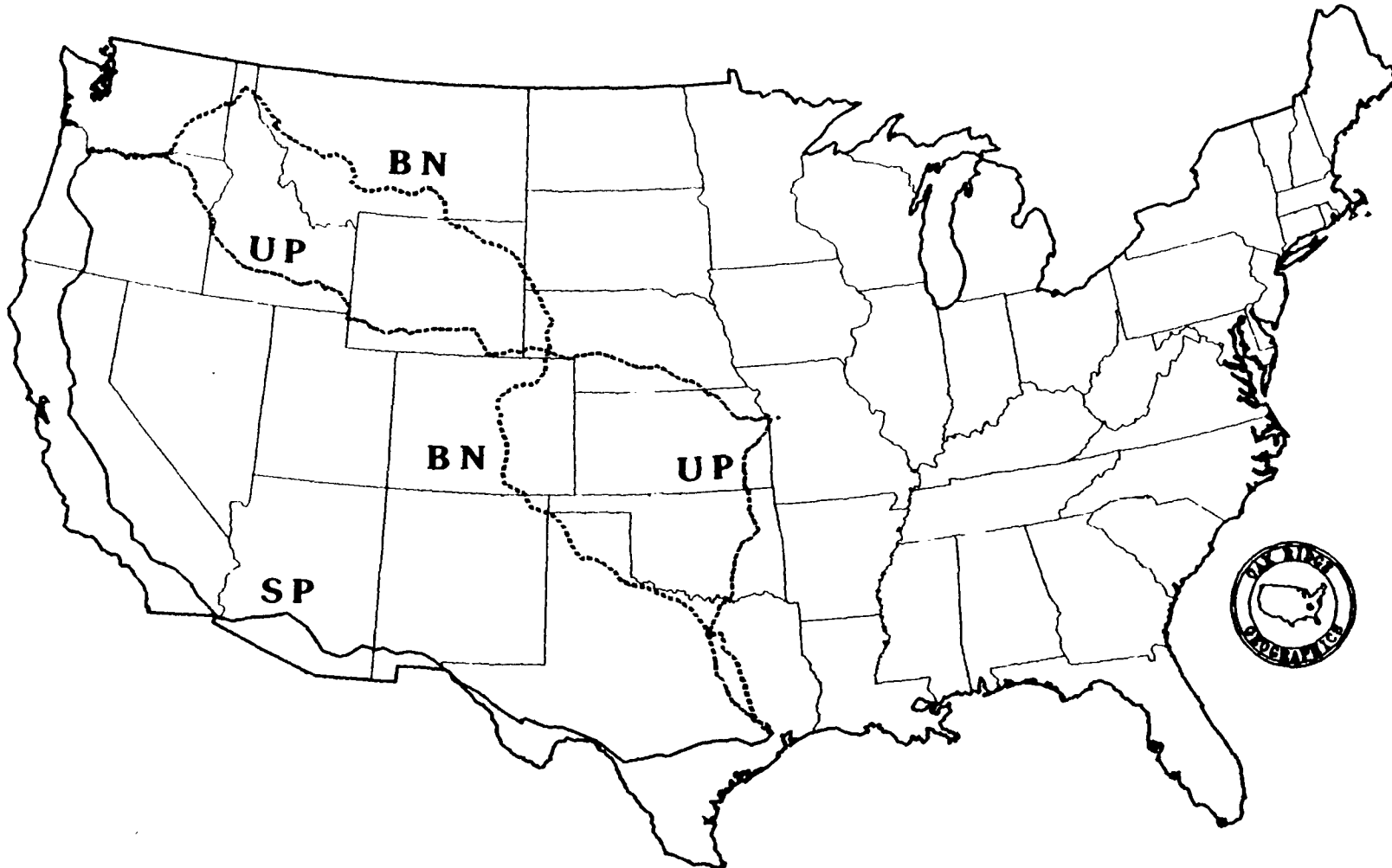
- **INTERLINE DATA BASE**

- **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



# 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**