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**HAZARDOUS MATERIALS TRANSPORTATION
AND EMERGENCY RESPONSE PROGRAMS***

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*Research sponsored by the Office of Defense Waste and By-Products Management, U. S. Department of Energy, under contract W-7405-eng-26 with Union Carbide Corporation.

HAZARDOUS MATERIALS TRANSPORTATION AND EMERGENCY RESPONSE PROGRAMS*

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RESEARCH SPONSORED BY
TRANSPORTATION TECHNOLOGY CENTER
SANDIA NATIONAL LABORATORIES

AND

TRANSPORTATION OPERATIONS AND TRAFFIC MANAGEMENT
U.S. DEPARTMENT OF ENERGY

*Research sponsored by the Office of Defense Waste and By-Products Management, U.S. Department of Energy, under contract W-7405-eng-26 with Union Carbide Corporation.

HAZARDOUS MATERIALS TRANSPORTATION AND EMERGENCY RESPONSE PROGRAM

- o DETAILED ROUTING CAPABILITIES
 - TRUCK
 - RAIL
 - BARGE
- o LEGISLATIVE DATA BASE (LDB) FOR HAZARDOUS MATERIALS
 - FEDERAL, STATE, AND LOCAL ACTIONS
 - PERMITS, NOTIFICATIONS, ESCORTS, AND PROHIBITED AREAS
- o EMERGENCY RESPONSE
 - AIRPORT LOCATIONS
 - SEARCH PROGRAM
 - DIRECTORY OF OPERATIONAL RESTRICTIONS AND EMERGENCY RESPONSE CONTACTS
- o SYSTEMS ANALYSIS
 - MAPPING CAPABILITIES

ROUTING

TRUCK

- o HIGHWAY PROGRAM
- o APPROXIMATELY 240,000 MILES OF HIGHWAYS IN THE U.S.
- o EACH NODE IDENTIFIED BY LATITUDE AND LONGITUDE
- o ALL INTERSTATES, U.S. HIGHWAYS, AND PRINCIPAL STATE ROADS
- o MAJOR AIRPORTS AND OTHER SIGNIFICANT SITES IDENTIFIED
- o SYSTEM IS INTERACTIVE

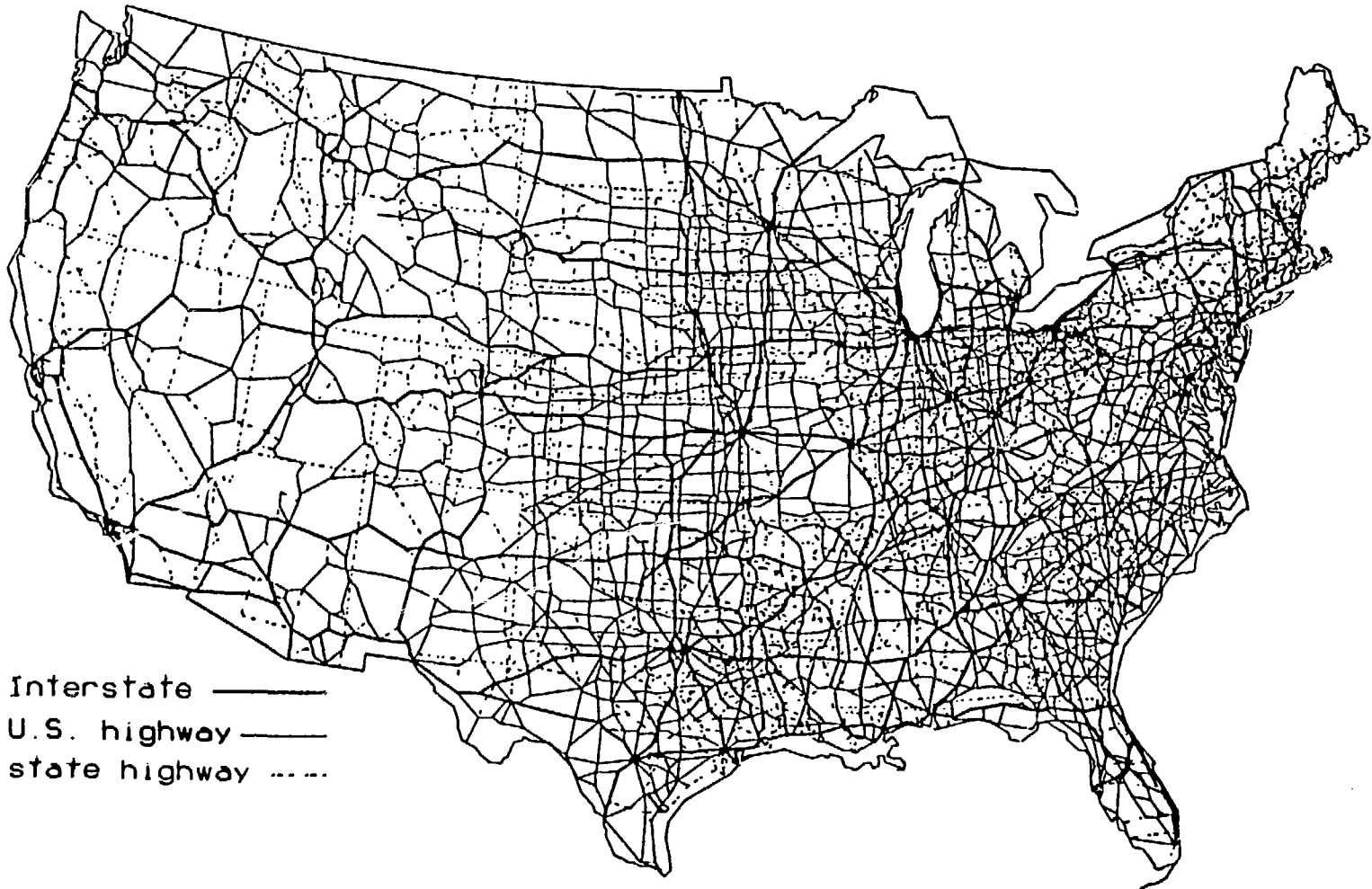
RAIL

- o ALL MAJOR RAIL LINES AND TRACKAGE
- o ALL INTERCHANGE POINTS
- o EACH NODE IDENTIFIED BY LATITUDE AND LONGITUDE
- o SYSTEM IS INTERACTIVE

BARGE

- o INLAND BARGE ROUTES IN RAIL DATA BASE
- o SYSTEM IS INTERACTIVE

HIGHWAY DATA BASE



HIGHWAY PROGRAM

- o PREDICTS NORMAL COMMERCIAL ROUTE
- o PREDICTS ROUTE WITH USER-INPUT CONSTRAINTS
- o PREDICTS TRANSIT TIME
 - ONE- OR TWO-TEAM OPERATION
 - UTILIZES ACTUAL OR PROJECTED STARTING TIME
 - PREDICTS ARRIVAL TIME
 - TRANSIT TIME REFLECTIVE OF HIGHWAY TYPE
- o IDENTIFIES TOTAL MILEAGE BY STATE AND ROAD TYPE

TYPICAL ROUTE LISTING

(UNCONSTRAINED ROUTE FLORIDA CITY, FL TO GALLUP, NM)

FROM: TURKEY POINT NP FL LEAVING : 4/26/83 AT 15: 4
 TO : GALLUP NM ARRIVING: 4/28/83 AT 12:45

ROUTE TYPE: C WITH 2 DRIVER(S) TOTAL ROAD TIME: 45:42
 TIME BIAS: 0.70 MILE BIAS: 0.30 TOLL BIAS: 1.15 TOTAL MILES: 2128.0

STATE MILEAGE:

NM 352.0 TX 603.0 LA 191.0 MS 201.0 AL 63.0 FL 718.0

MILEAGE BY HIGHWAY TYPE:

INTERSTATE: 1297.0 U.S.: 789.0 STATE: 0.0 TURNPIKE: 33.0
 COUNTY: 0.0 LOCAL: 9.0 OTHER: 0.0

CONTINUE WITH ROUTE LISTING? (Y/N)

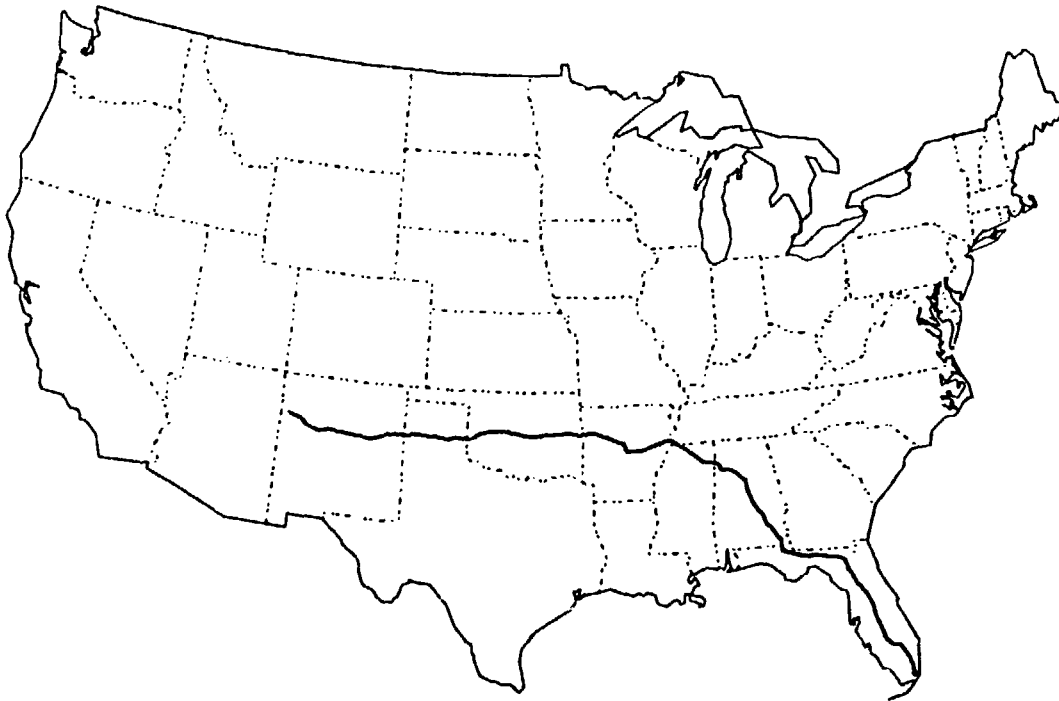
y

FROM: TURKEY POINT NP FL LEAVING : 4/26/83 AT 15: 4
 TO : GALLUP NM ARRIVING: 4/28/83 AT 12:45

ROUTING THROUGH:

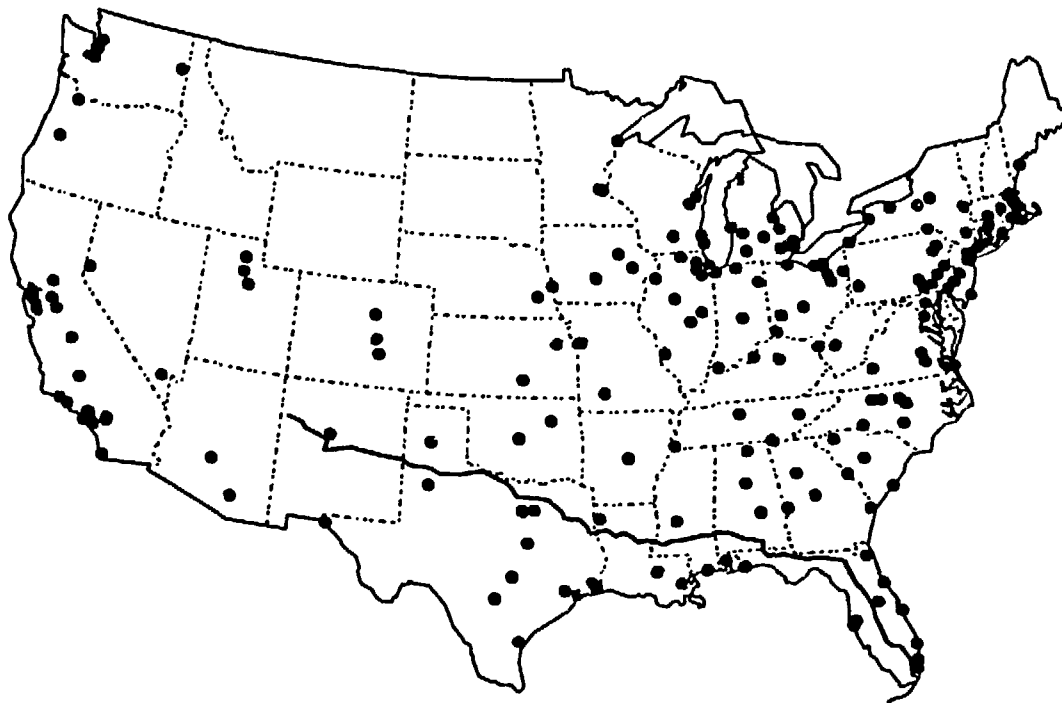
0.0	TURKEY POINT	NP	FL	0.0	4/26/83 AT 15: 4
9.0	LOCA HOMESTEAD	E	THEF LOCL FL	9.0	4/26/83 AT 15:23
33.0	THEF\$ PENNSUCO	NW	U27 THEF FL	42.0	4/26/83 AT 15:59
290.0	U27 OCALA	NW	I75 U27 FL	332.0	4/26/83 AT 22:18
82.0	I75 WINFIELD	W	I10 I75 FL	414.0	4/26/83 AT 23:48
342.0	I10 MOBILE		AL	756.0	4/27/83 AT 7: 1
86.0	U98 HATTIESBURG	SE	U49 U98 MS	842.0	4/27/83 AT 9:27
6.0	U49 HATTIESBURG		MS	848.0	4/27/83 AT 9:37
1.0	U98 HATTIESBURG	W	I59 X13 MS	849.0	4/27/83 AT 9:40
2.0	I59 HATTIESBURG	NW	I59 X14 MS	851.0	4/27/83 AT 9:42
84.0	U49 JACKSON	SE	I20 X19 MS	935.0	4/27/83 AT 11:21
393.0	I20 MESQUITE	NW	I20 I635 TX	1328.0	4/27/83 AT 19:32
21.0	I635 DALLAS	N	I35E I635 TX	1349.0	4/27/83 AT 19:55
25.0	I35E DENTON	S	I35E I35W TX	1374.0	4/27/83 AT 20:23
2.0	I35 DENTON	W	I35 U380 TX	1376.0	4/27/83 AT 20:25
25.0	U380 DECATUR		TX	1401.0	4/27/83 AT 20:57
74.0	U287 WICHITA FALLS	SE	U281 U287 TX	1475.0	4/27/83 AT 22:54
3.0	U281 WICHITA FALLS		TX	1478.0	4/27/83 AT 22:58
3.0	U277 WICHITA FALLS	N	U277 U287 TX	1481.0	4/27/83 AT 23: 4
39.0	U287 OKLAUNION		TX	1520.0	4/27/83 AT 23:55
9.0	U183 VERNON		TX	1529.0	4/28/83 AT 0: 6
169.0	U287 AMARILLO	E	I40 U287 TX	1698.0	4/28/83 AT 3:55
430.0	I40 GALLUP		NM	2128.0	4/28/83 AT 12:45

ESTIMATED HIGHWAY ROUTE
FROM FLORIDA CITY, FL TO GALLUP, NM
CONSTRAINTS: LDB*

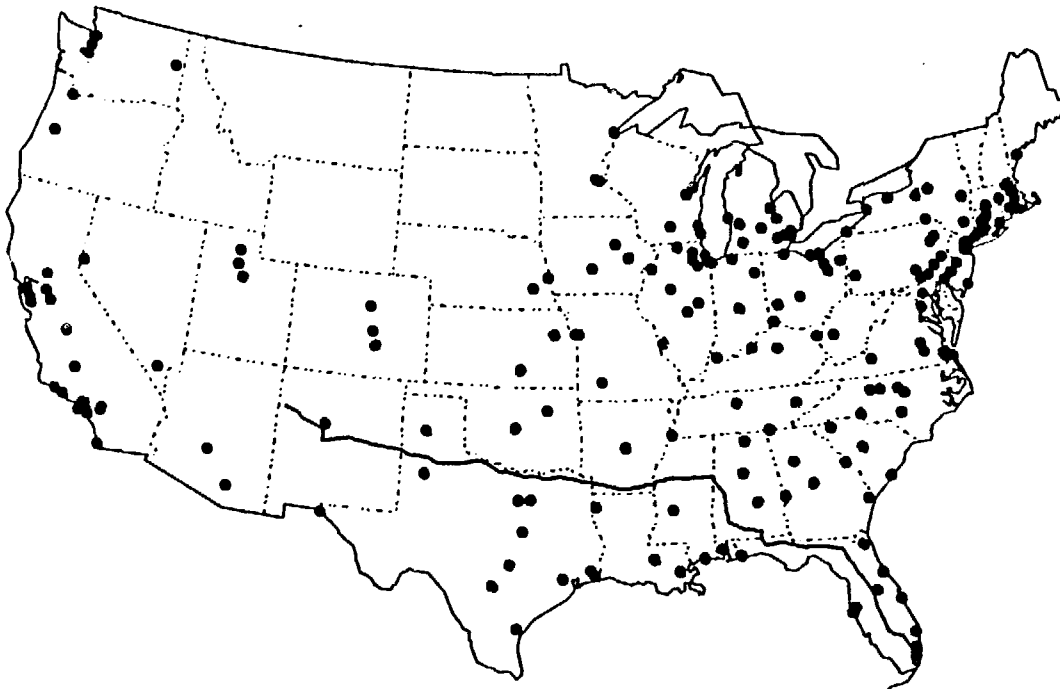


*BYPASSING A LEGISLATIVE RESTRICTION IN LOUISIANA.

ESTIMATED HIGHWAY ROUTE
FROM FLORIDA CITY, FL TO GALLUP, NM
CONSTRAINTS: BYPASS MAJOR CITIES

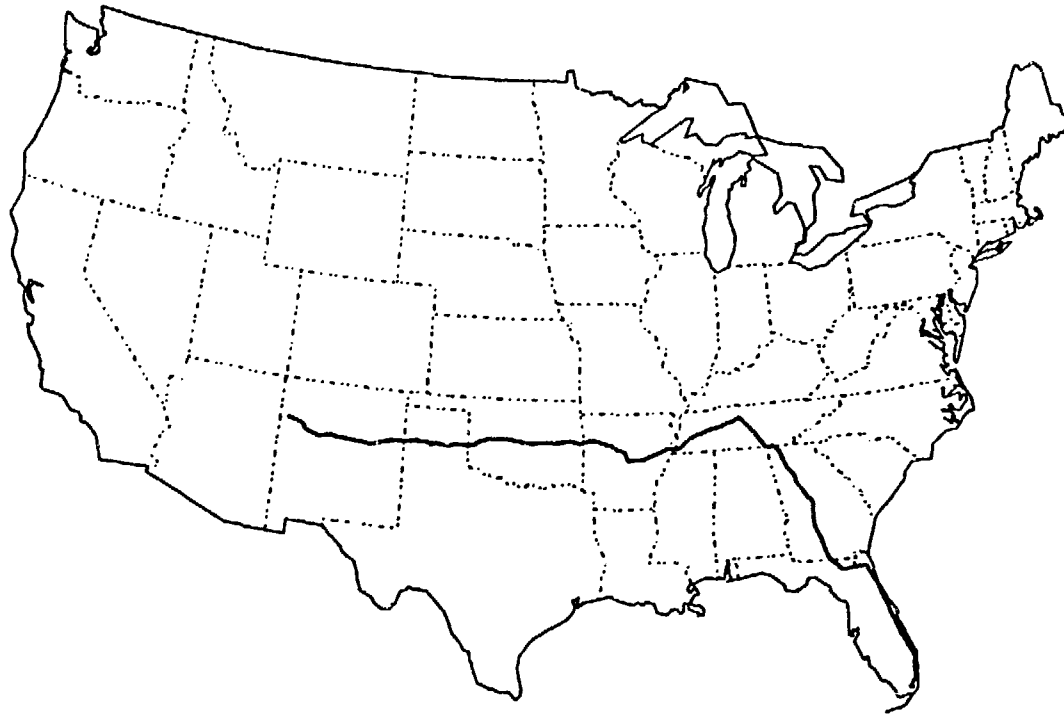


ESTIMATED HIGHWAY ROUTE
FROM FLORIDA CITY, FL TO GALLUP, NM
CONSTRAINTS: LDB* AND BYPASS MAJOR CITIES



*BYPASSING A LEGISLATIVE RESTRICTION IN LOUISIANA.

ESTIMATED HIGHWAY ROUTE
FROM FLORIDA CITY, FL TO GALLUP, NM
CONSTRAINTS: USING INTERSTATE HIGHWAYS



RESULTS OF ROUTING STUDIES

HIGHWAY USAGE FOR ALTERNATIVE ROUTES BETWEEN
FLORIDA CITY, FL AND GALLUP, NM

Routing constraints	Distance (miles)	Transit time
None	2128	45:42
LDB*	2216	47:39
Bypass major cities	2233	52:20
LDB + Bypass major cities	2254	53:37
Interstate highways	2328	48:17
Interstate highways + bypass major cities	2624	59:43

HIGHWAY USAGE FOR ALTERNATIVE ROUTES BETWEEN
FLORIDA CITY, FL AND GALLUP, NM

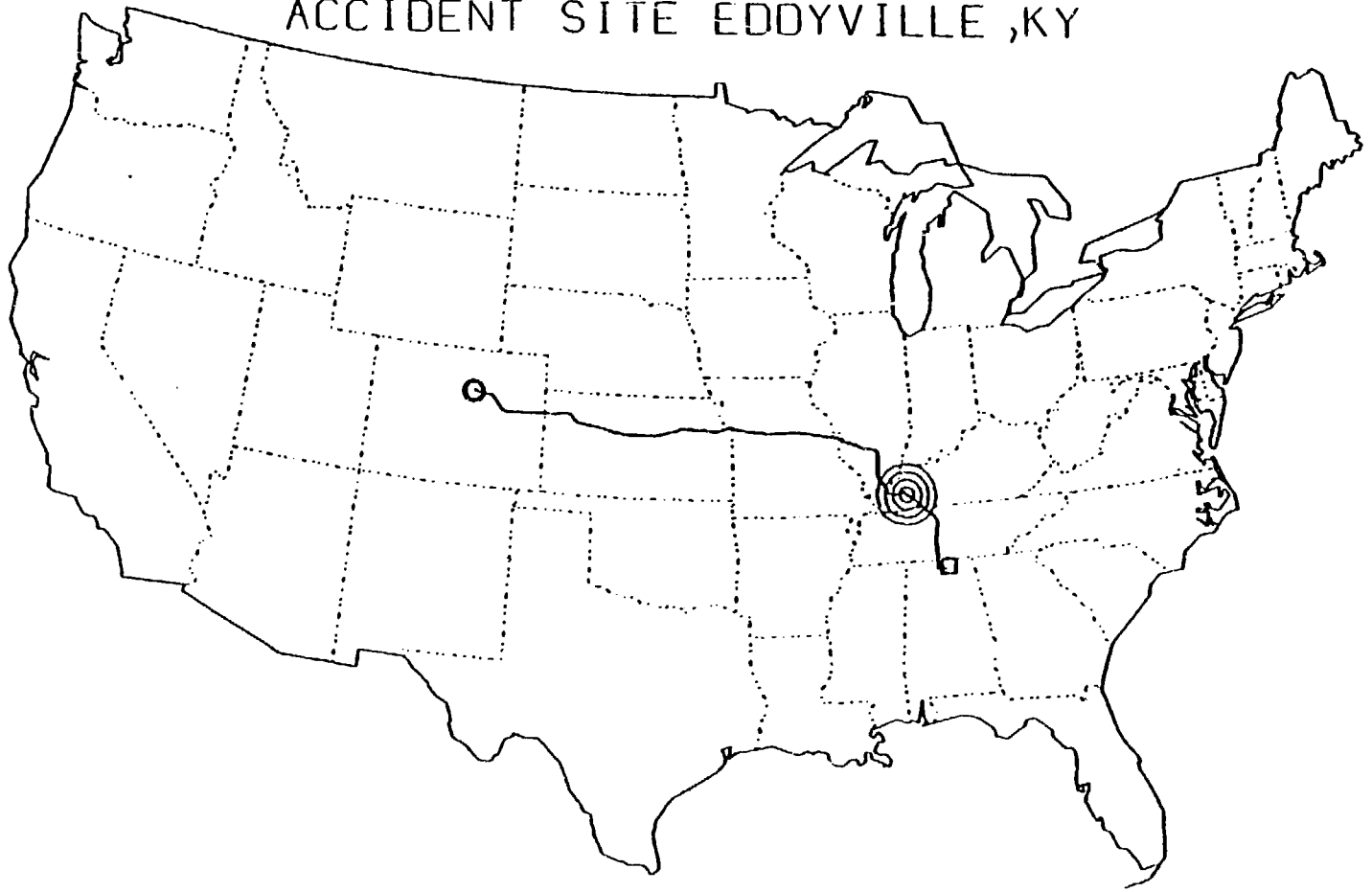
Routing constraint	Highway usage, %		
	Interstate	US	State
None	62.5	37.0	0.5
LDB	69.2	30.3	0.5
Bypass major cities	21.0	74.0	5.0
LDB + Bypass major cities	20.4	73.3	6.3
Interstate highways	99.0	0.6	0.4
Bypass major cities + Interstate highways	56.0	35.0	9.0

*Legislative Data Base.

EMERGENCY RESPONSE

- o LOGISTICS
 - AVAILABLE AIRPORT INFORMATION COVERS LOCATION (LATITUDE AND LONGITUDE), RUNWAY LENGTH, WIDTH, SURFACE, LOAD LIMITS FOR AIRCRAFT TYPES, INSTRUMENT CAPABILITIES, ETC.
 - SEARCH PROGRAM WILL PERMIT IDENTIFICATION OF NEARBY AIRPORTS WITH REQUIRED CAPABILITIES
 - BOTH COMMERCIAL AND MILITARY AIRPORTS IDENTIFIED IN HIGHWAY PROGRAM

ACCIDENT SITE EDDYVILLE ,KY

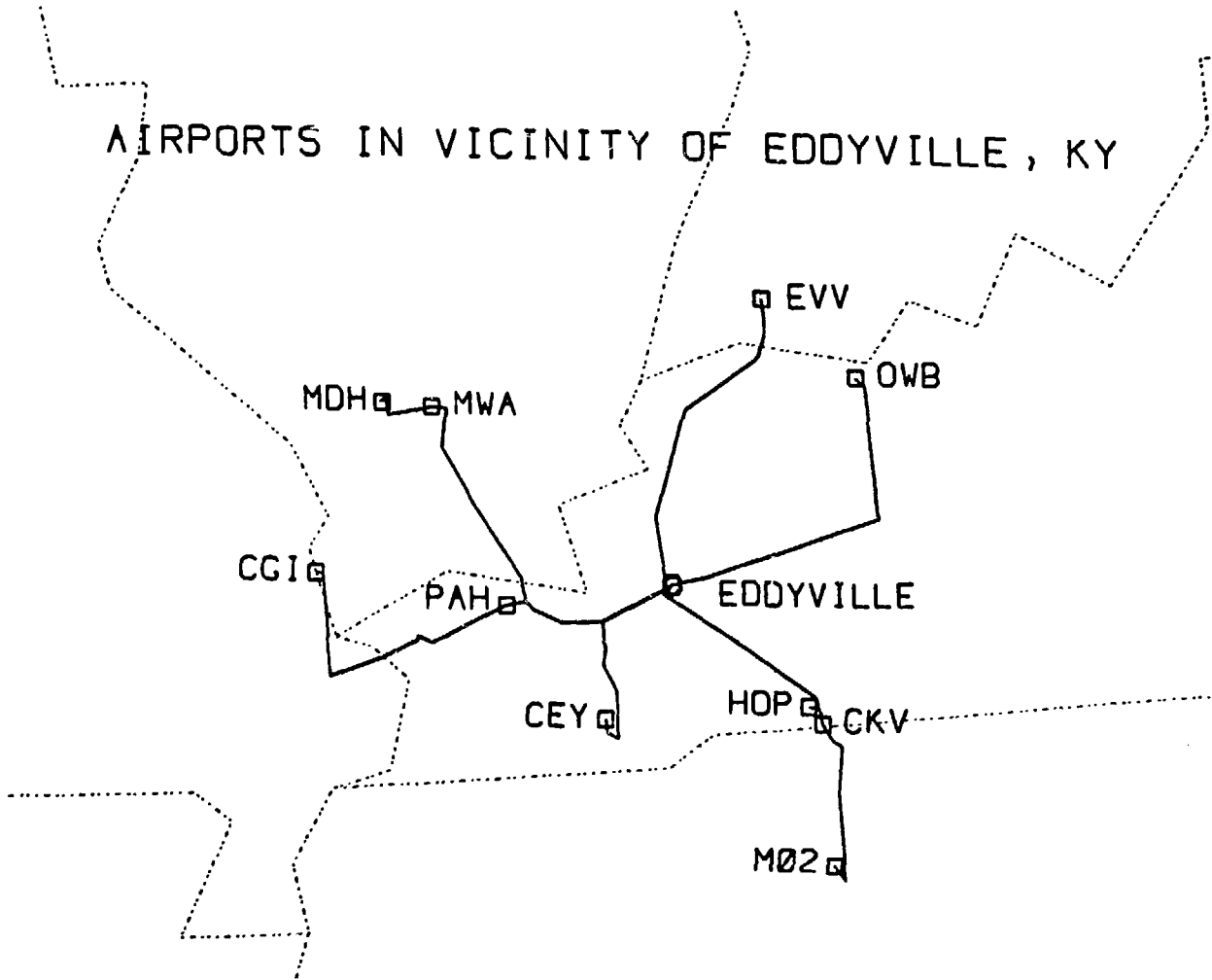


Airports in the vicinity of Eddyville, KY

Airport location		Road distance from airport (miles)	Driving time (h)
City	ID		
Paducah, KY	(PAH)	45	0.87
Fort Campbell, KY	(HOP)	54	1.02
Clarksville, TN	(CKV)	56	1.03
Murry ^a , KY	(CEY)	53	1.15
Owensboro, KY	(OWB)	92	1.80
Marion, IL	(MWA)	98	1.82
Evansville, IN	(EVV)	87	1.98
Carbondale, IL	(MDH)	114	2.18
Dickson, TN	(MO2)	101	2.30
Cape Girardeau, MO	(CGI)	126	2.52

Runway requirements: none.

AIRPORTS IN VICINITY OF EDDYVILLE, KY



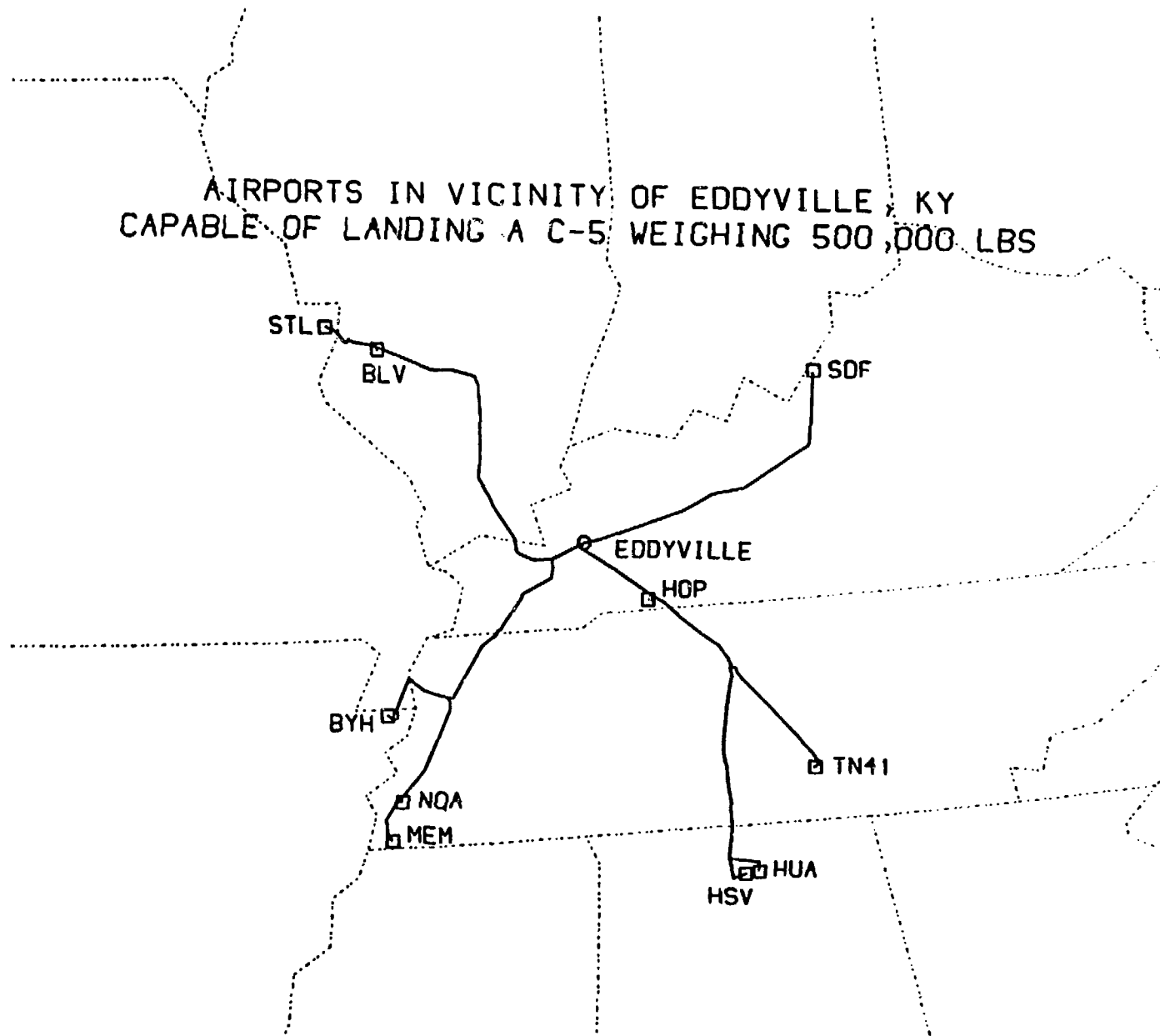
MDH □ MWA □
CGI □ PAH □ EDDYVILLE □
CEY □ HOPE □ GKV □
EVV □ OWB □
M02 □

AIRPORTS IN THE VICINITY OF EDDYVILLE, KY

Airport location		Road distance from airport (miles)	Driving time (h)
City	ID		
Fort Campbell, KY	(HOP)	54	1.02
Blytheville, AR	(BYH)	171	3.32
Louisville, KY	(SDF)	177	3.22
Tullahoma, TN	(TN41)	178	3.28
Millington, TN	(NQA)	179	3.47
Belleville, IL	(BLV)	192	3.52
Memphis, TN	(MEM)	206	3.95
Huntsville, AL	(HSV)	222	4.07
St. Louis, MO	(STL)	223	4.10
Redstone Arsenal, AL	(HUA)	227	4.22

Runway requirements: C5 aircraft; weight = 500,000 lbs

AIRPORTS IN VICINITY OF EDDYVILLE, KY
CAPABLE OF LANDING A C-5 WEIGHING 500,000 LBS



HAZARDOUS MATERIALS LEGISLATIVE DATA BASE

- o IDENTIFIES FEDERAL-, STATE-, AND LOCAL-LEVEL LEGISLATIVE ACTIONS (ABOUT 2500 RECORDS)
- o COVERS TRANSPORT, STORAGE, DISPOSAL, AND MANAGEMENT OF HAZARDOUS/RADIOACTIVE MATERIALS
- o ALSO COVERS POWER PLANT MORATORIUMS, SAFETY, AND REMEDIAL ACTION REQUIREMENTS
- o EMPHASIS ON PERMITS, NOTIFICATIONS, ESCORTS AND PROHIBITED AREAS FOR ALL MODES OF SHIPMENT
- o IDENTIFIES OPERATIONAL RESTRICTIONS FOR TUNNELS, BRIDGES, AND TOLL ROADS
- o OPERATES AS AN ONLINE, INTERACTIVE DATA FILE (DRAFT USERS' MANUAL: ORNL/TM-8512)

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**Legislative Data Base
Sample Record**

STATE Virginia
LOCALE State of Virginia
BILL NUMBER (1) VA-H01918
TITLE Chapter 3.3, Transportation of Hazardous Radioactive Materials
CURRENT STATUS (1) Required 03/27/79
HISTORICAL STATUS (1) Introduced 01/22/79
(2) Committee (General Laws), Date Unknown
SPONSOR Grayson; Diamondstein; Scott, R.C.; Dickinson; Murray; Michie
LEGISLATION TYPE State
REFERENCE REPORT None
SOURCE Bill; NRC State Program Report dtd. 3/23/79; GA Newsletter dtd. 6/19/79; DOE-ORO Trans. Br. Chief
CATEGORY (1) Notify
MODE Truck
REGION SE; 2
KEYWORDS (1) RADIOACTIVE MATERIALS
(2) NOTIFICATION
(3) PROHIBIT TRANSPORTATION
(4) HEALTH DEPARTMENT
(5) HAZARDOUS MATERIALS
(6) DEFINITIONS
(7) EMERGENCY SERVICES OFFICE
(8) ROUTES
COMMENTS Bill provides for defining of hazardous radioactive materials, require 5 days prior notification (including proposed route), provides for approval of plans, and provides for notification of local officials along route. Directs the Office of Emergency Services to monitor the transportation of radioactive materials within the state. Approval would be supplied by the coordinator of the Office of Emergency Services.
ABSTRACT The Coordinator of the Office of Emergency Services (COES), by July 31, 1979, in conjunction with the Commissioner of the Virginia Department of Health, shall define and make public a list of those hazardous radioactive materials, the transportation of which may constitute a significant potential danger to the citizens of the Commonwealth of Virginia in the event of accidental spillage or release. No person shall transport, or cause to be transported, into, through, or within the Commonwealth of Virginia any hazardous radioactive materials as defined by the COES pursuant to 44-146.30 of this chapter unless such person has notified the COES no later than five days before the transport of such materials. Such notice shall include (1) the route proposed to be taken, (2) the proposed time of transportation, (3) the material to be transported, (4) the method of the proposed transportation, and (5) any additional information that may be required by the COES. The COES shall approve, disapprove or approve with conditions, any plans to transport hazardous radioactive materials and shall notify the person submitting such plan of its approval, disapproval or conditional approval, no later than forty-eight hours before the proposed time of transport. The COES, as soon as practical after approval of plans to transport hazardous radioactive material, and no later than twenty-four hours before the time of such transport begins, shall notify the appropriate official in such political subdivision through which such shipment shall pass of the route, time, and nature of the hazardous material to be transported. The Board of Health will promulgate rules and regulations governing the transportation of radioactive materials by January 1, 1980.

DIRECTORY OF OPERATIONAL RESTRICTIONS AND EMERGENCY RESPONSE
(ORER) CONTACTS DATA BASE

- o IDENTIFIES KEY STATE AND LOCAL AGENCY/PERSONNEL CONTACTS
FOR TRANSPORTATION OF HAZARDOUS/RADIOACTIVE MATERIALS (ALL
50 STATES - ABOUT 1000 ENTRIES)
- o INCORPORATES ALL OPERATIONAL RESTRICTIONS WITH MAJOR CONTACT
- o CURRENT ADDRESS AND PHONE NUMBER FOR EACH CONTACT
- o HIGHLIGHTS EMERGENCY RESPONSE CONTACTS WITH 24-h PHONE NUMBERS
- o OPERATES AS AN ONLINE, INTERACTIVE DATA FILE (USERS' MANUAL
IN PREPARATION: ORNL/TM-8742)

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**ORER Data Base
Sample Record**

STATE		Pennsylvania
LOCALE		Pennsylvania Turnpike
LEGISLATION TYPE		Operational
CATEGORY	(1)	Prohibit
NAME		Clarence Wright, Safety Director
STREET		Administration Building, Highspire, P. O. Box 8531
CITY		Harrisburg
STATE CODE		PA
ZIPCODE		17105
PHONE		717/939-9551, ext. 222
EMERGENCY NO.		800/932-0586
COMMENTS		Shipments of radioactive materials are banned from Pennsylvania Turnpike, must route around; combustibles, fuel oil, and non-flammable gas are allowed with permits through Permit Section.
KEYWORDS	(1)	PROHIBIT TRANSPORTATION
	(2)	RADIOACTIVE MATERIALS
	(3)	PERMITS
	(4)	HAZARDOUS MATERIALS
REFERENCE MATERIALS	(1)	Pennsylvania Turnpike Map
CORRESPONDENCE		Phone call 8/82

CONTACTS FOR ADDITIONAL INFORMATION

TRANSPORTATION TECHNOLOGY CENTER
SANDIA NATIONAL LABORATORIES
P. O. BOX 5800
ALBUQUERQUE, NM 87185
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