Figure 1. Mississippi River Corridor Study Area

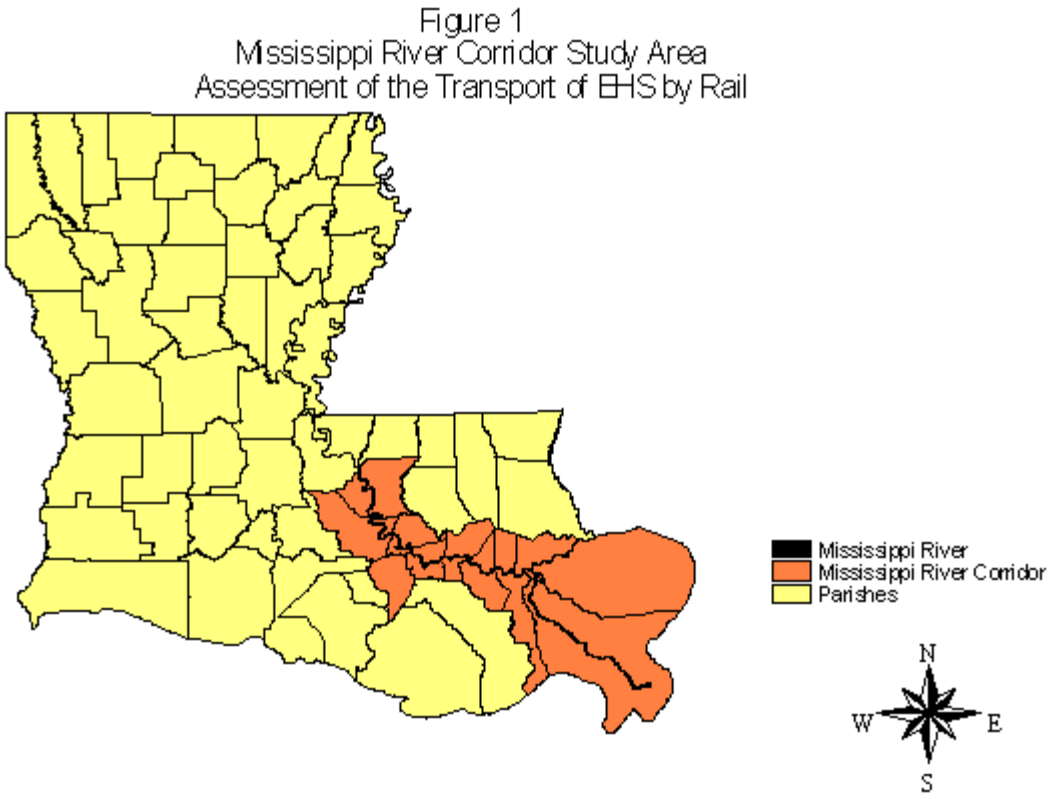


Table 1. Selected meteorological conditions

Meteorological scenario	Temperature (°F)	Relative humidity	Wind speed (miles/hr)	Cloud cover	Stability Class
Low wind, Stable (Summer)	74	93%	3.6	0.5	F
Night Time, Winter	45	85	7.4	0.6	D
Night Time, Intermediate	57	89	6.3	0.6	E
Daytime, Winter	58	57	10.8	0.7	C
Daytime, Summer	88	58	8.6	0.6	C

Rail Scenario #1

The most conceivable incident involving a rail car leading to release of cargo is a derailment. The most vulnerable section of the car is its side where there are no guard plates installed. Guard plates and structures are installed at the two ends and at the top of the car, which limit the impact of a possible accident. Thus, most accidents leading to cargo release will result from a side impact.

In scenario #1 it is assumed that as the result of a derailment, flying objects, such as pieces of rail or other debris, hit the side of the tank and creates a rectangular opening with an approximate size of 12 inches by 6 inches. The car leaves the rails, slides down the embankment and comes to rest such that the leak occurs at 50% of the tank height defined by its diameter.

Rail Scenario #2

The second most vulnerable part of a rail car is its flanges. In order to limit the consequences of a possible flange failure, the US DOT requires that cars transporting EHS materials be equipped with safety valves in the shell side of the flanges.

In scenario #2 it is assumed that as the result of a derailment, the rail car leaves the tracks and slides or rolls down from the embankment. In doing so, one of the flanges shears off and creates an opening at 50% of the tank height defined by its diameter. The safety valve behind the flange engages but does not provide a hermetic seal. The cargo leaks at a rate equivalent to that provided by a 0.5-inch diameter hole.

Table 2. Rail Car Vulnerability Zones
Incident Scenario #1: Six Inch by 12 Inch Breach

Chemical	Calm Atmosphere	Night time Winter	Night time Intermediate	Day time Winter	Day time Summer
Acrylamide	No Data				
Acrylonitrile	B+	A	A	A	A+
Aluminum Sulfate Solution					
Aniline	A*	A*	A*	A*	A
Ammonia	D	C	C	C	C
Antimony Pentafluoride	No Data				
Arsenic Trioxide	No Data				
Benzene	A	A*	A*	A*	A*
Benzyl Chloride	A	A*	A*	A*	A*
Carbon Bisulfide	A	A*	A	A*	A
Chlorine	D	C	C	D	C
Chloroacetic Acid	NOI	NOI	NOI	NOI	NOI
Chloroform	A	A*.	A*	A*	A
Cyclohexylamine	A+	A*+	A*+	A*+	A*+
Dimethyl Hydrazine	No Data				
Dinitro-O-Cresol	No Data				
Epichlorohydrin	A	A*	A*	A*	A*
Ethylene Oxide	B	A	A	A	B
Ethanolamine	A*	A*	A*	A*	A*
Ethylenediamine	A*	A*	A*	A*	A*
Formaldehyde	No Data				
Gyloxal	No Data				
Hydrogen Chloride	D	C	C	C	C
Hydrogen Cyanide	D	B	C	B	C
Hydrogen Fluoride	D	C	D	B	D
Hydrogen Peroxide	A*	A*	A*	A*	A*
Hydrazine	B+	A*	A+	A+	A*
Hydrazine Hydrate	No Data				
Hexachlorocyclopentadiene	No Data				
Isopropylamine	A	A*	A	A*	A
Methylhydrazine	No Data				

Table 2. Rail Car Vulnerability Zones

Methyl Mercaptan	C	B	B	B	B
Mustard Gas	No Data				
Nitrobenzene	A*	A*	A*	A*	A*
Phenol, Molten	A*	A*	A*	A*	A*
Phosphoric Acid (Solid below 107.6F.)	NOI				
Potassium Cyanide (Solid)	NOI				
Propylene Oxide	A	A	A	A	A
Sodium Cyanide (Solid)	NOI				
Sulfuric Acid	A*	A*	A*	A*	A*
Sulfuric Acid , Fuming	A*	A*	A*	A*	A*
Sulfur Dioxide	C	B	B	B	B
Sulphur Trioxide	B	NOI (solid)	NOI (solid)	NOI (solid)	A
Toluene Diisocyanate	A*	NOI	A*	A*	A*
Tolvltriazole, Sodium	No data				

NOTES:
NOI = No Off-site Impact
A* = the footprint was less than 500 Yards

Weather Conditions

#1 Low Wind Atmosphere: 74F, 93% Relative Humidity, Stability Class F
#2 Night Time, Winter: 45F, 85% Relative Humidity, Stability Class D
#3 Night Time, Intermediate: 57F, 89% Relative Humidity, Stability Class E
#4 Daytime, Winter: 58F, 57% Relative Humidity, Stability Class C
#5 Daytime, Summer: 88F, 58% Relative Humidity, Stability Class C

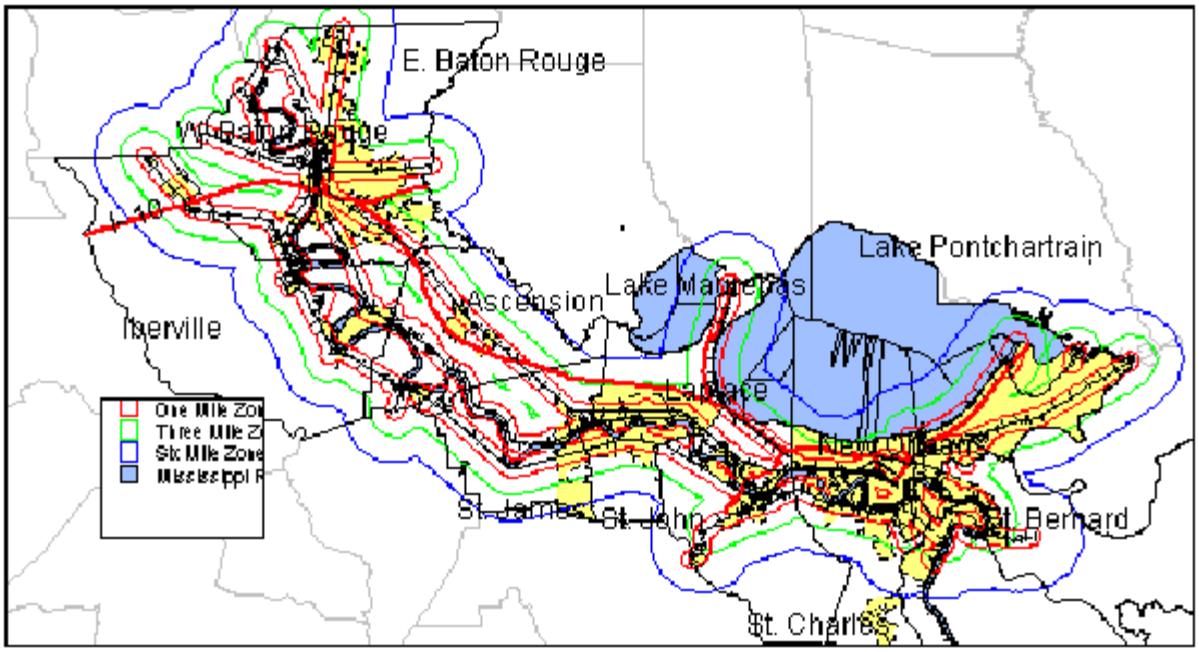
Vulnerability Zones

A= < 1 mile
B= 1 mile to < 3 miles
C= 3 miles to < 6 miles
D= > 6 miles

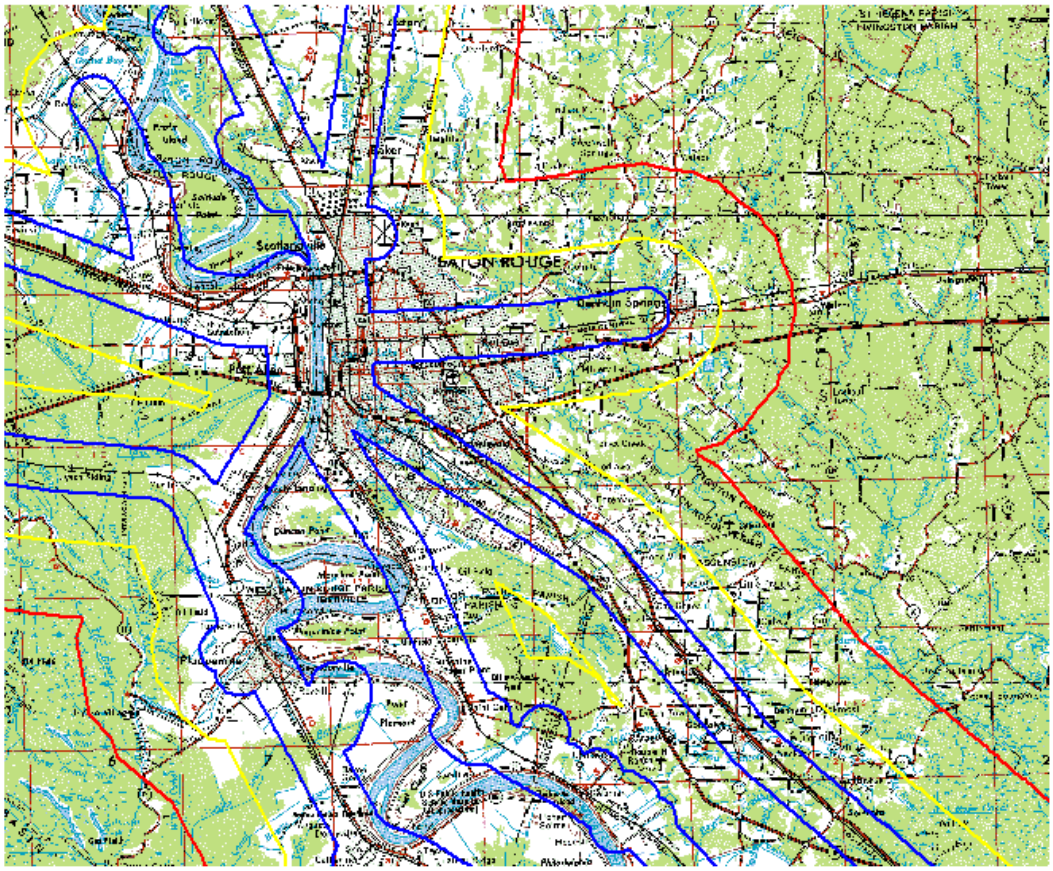
Table 4. Population Estimates by Vulnerability Zone for Rail Lines on the Mississippi River Corridor

Vulnerability Zone	Population	Families
Six Mile Zone	1,559,924	395,559
Three Mile Zone	1,449,230	365,532
One Mile Zone	986,874	245,103

Figure 2: Rail Car Vulnerability Zones - Mississippi river Corridor



Hazardous Materials Transportation Study
Vulnerability Zones
Baton Rouge, LA



10 0 10 20 Miles

USGS Quad Sheets
1:250,000 Scale

6 Mile Buffer
3 Mile Buffer
1 Mile Buffer

Institute for Environmental Studies
Louisiana State University

N
W E
S