Ammonia

- Non-toxic: inhalation hazard only
- Ammonia is the most common hazardous material shipped per year (tons shipped by rail)

Ammonia
DOT Classification

- The Hazardous Material Table of the United States Department of Transportation designates the hazard class for ammonia as "non-flammable gas" and lists ammonia as a hazardous substance with a reportable quantity (RQ) of 100 pounds. The 4-digit United Nations identification number for ammonia is 1005.

Non Accidental Releases

Since 1991 Non-Accident Releases (NAR's) have decreased,

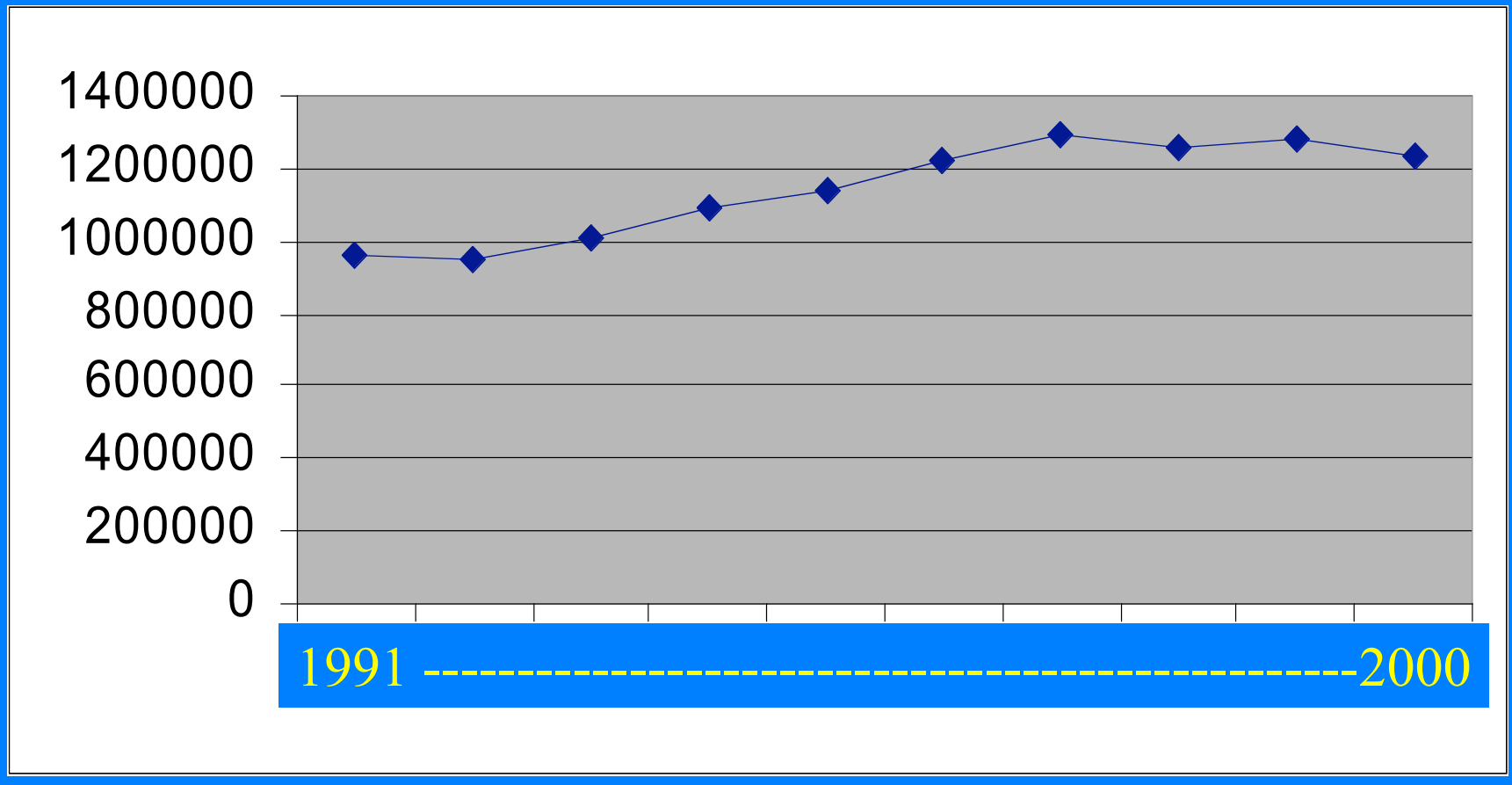
29% in the United States

42% in Canada.

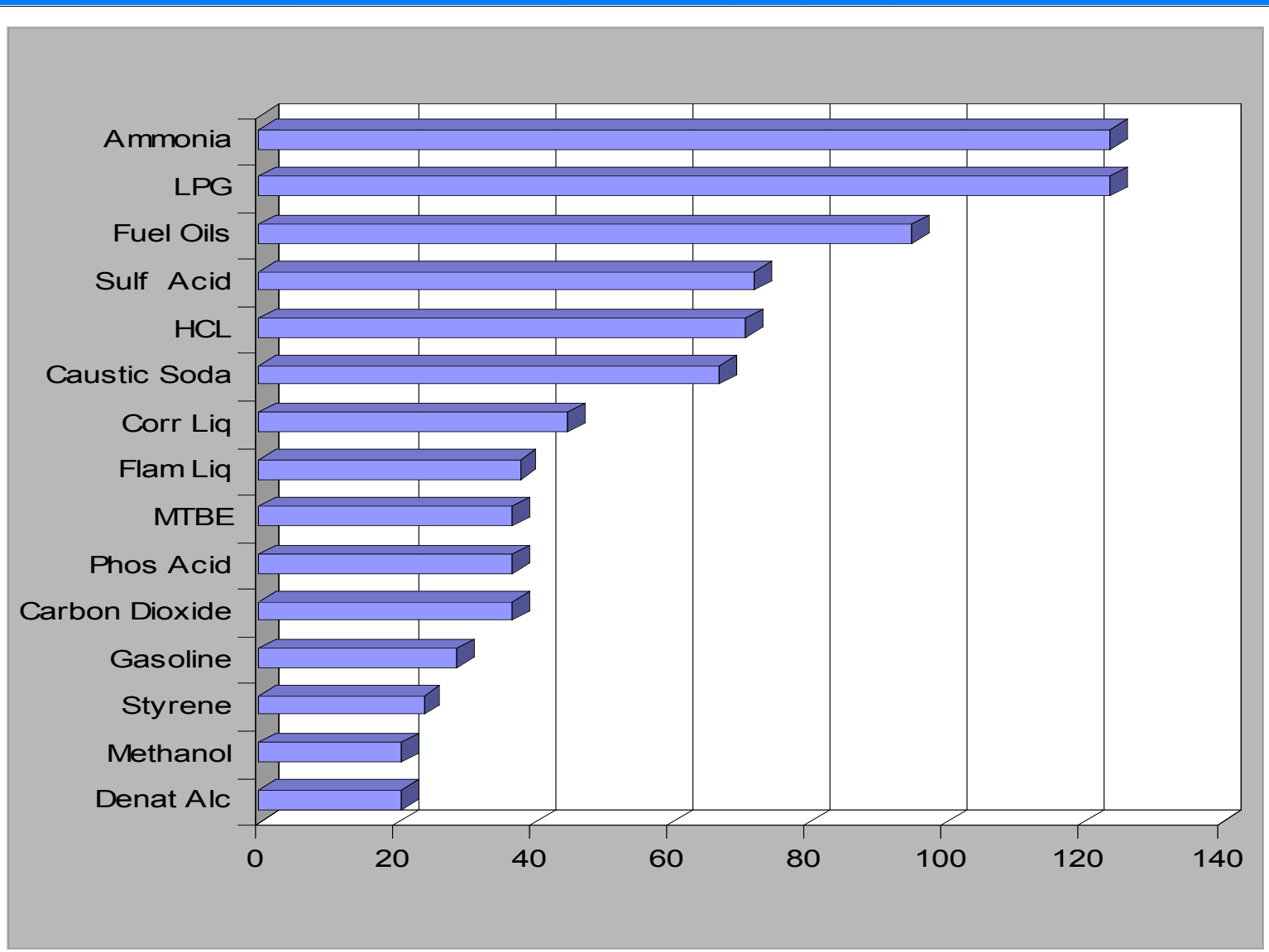
- MI inspection on rail cars and tanks
- Upgraded MI to include current non destructive testing, above and beyond just hydrotesting
- New rail cars do not have slip tube gauge rods, which reduce packing leaks
- Improvement in valve design to prevent leaks

- *89% of the Reported NAR's were releases of vapor or liquid less than 10 gallons.*
- *8% more than 10 gallons.*
- *3% more than 100 gallons.*

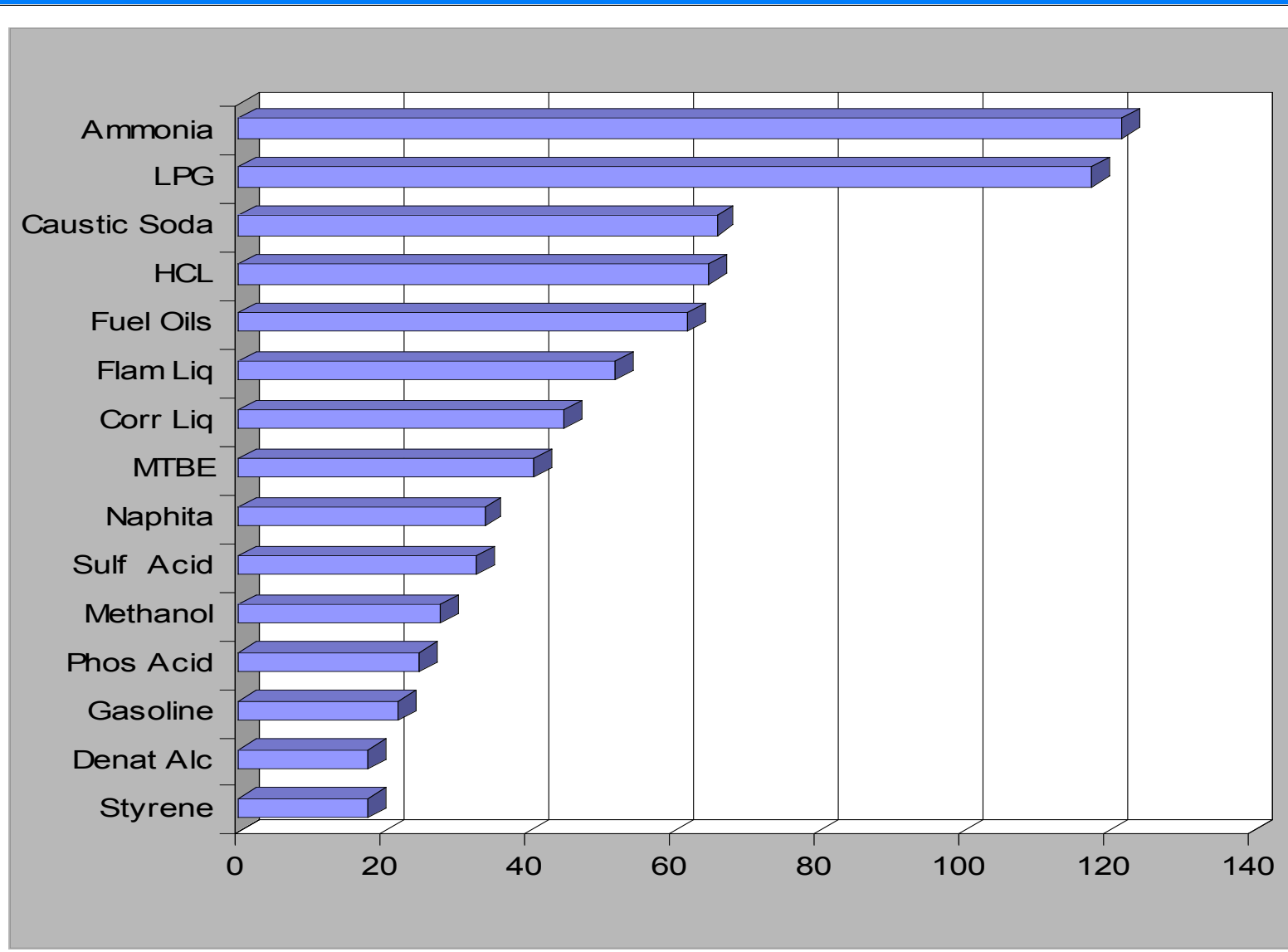
Shipments of Hazardous Materials by Tankcars



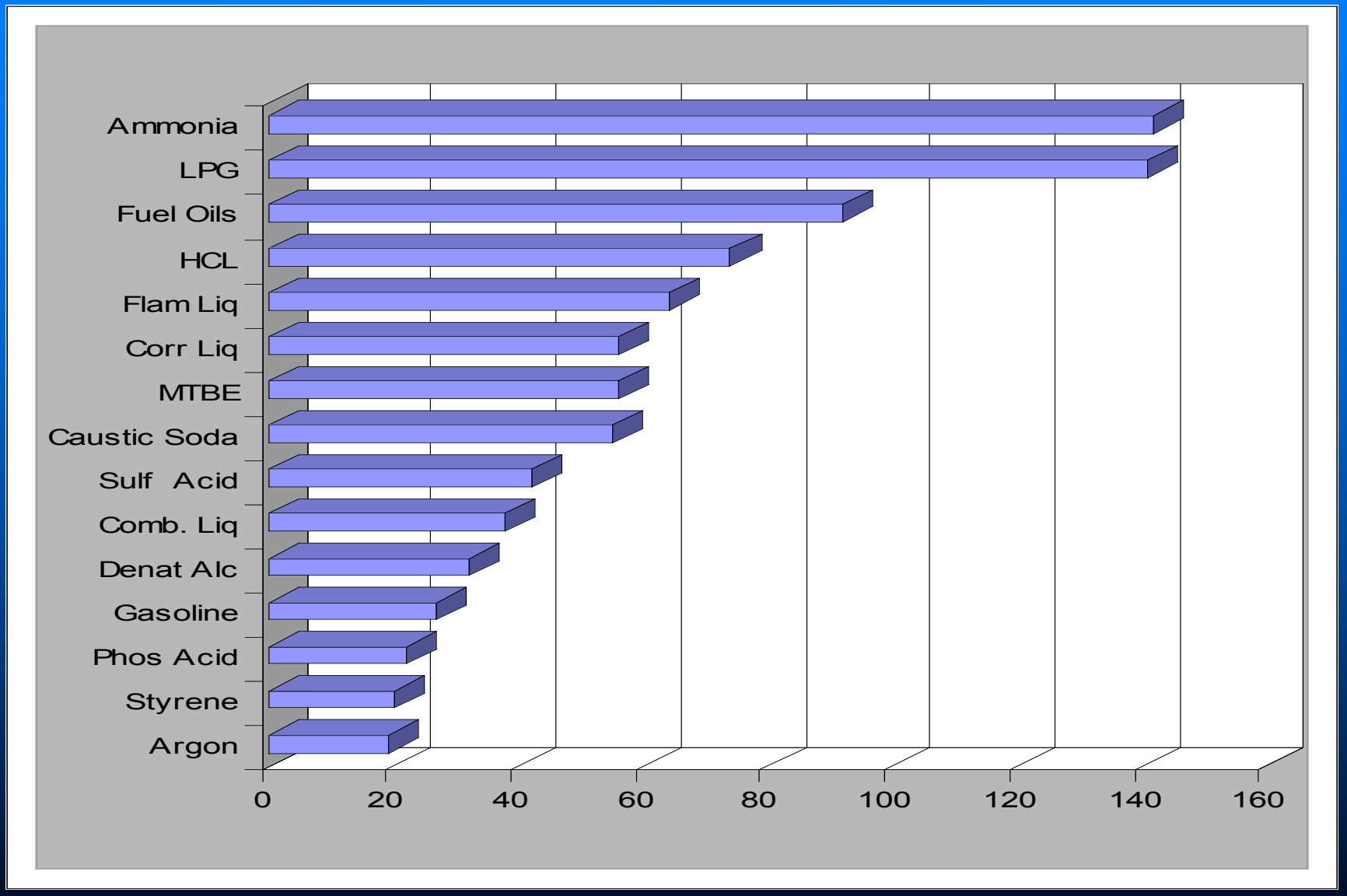
Top 15 Non-Accident Releases 1997



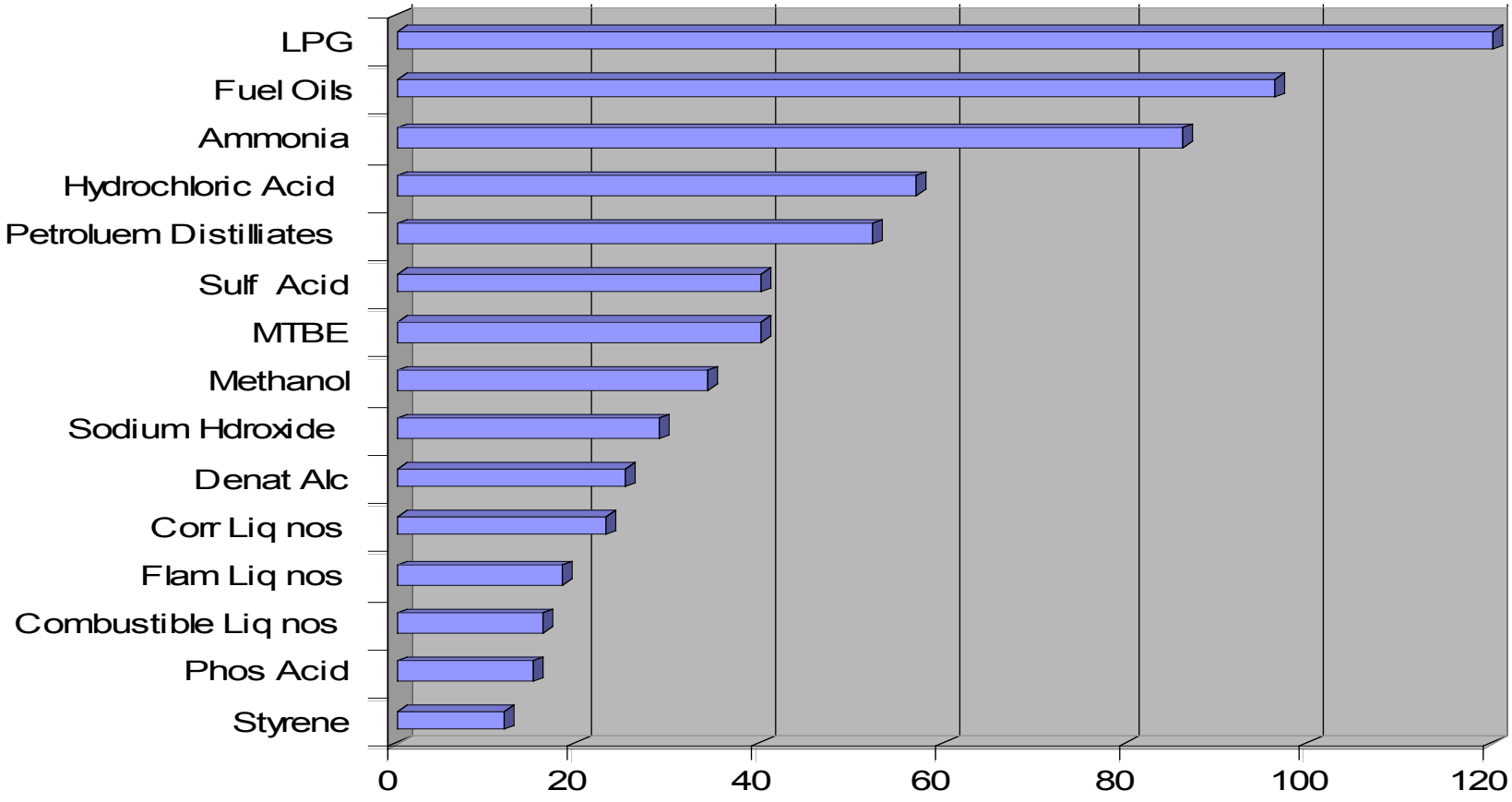
Top 15 Non-Accident Releases 1998



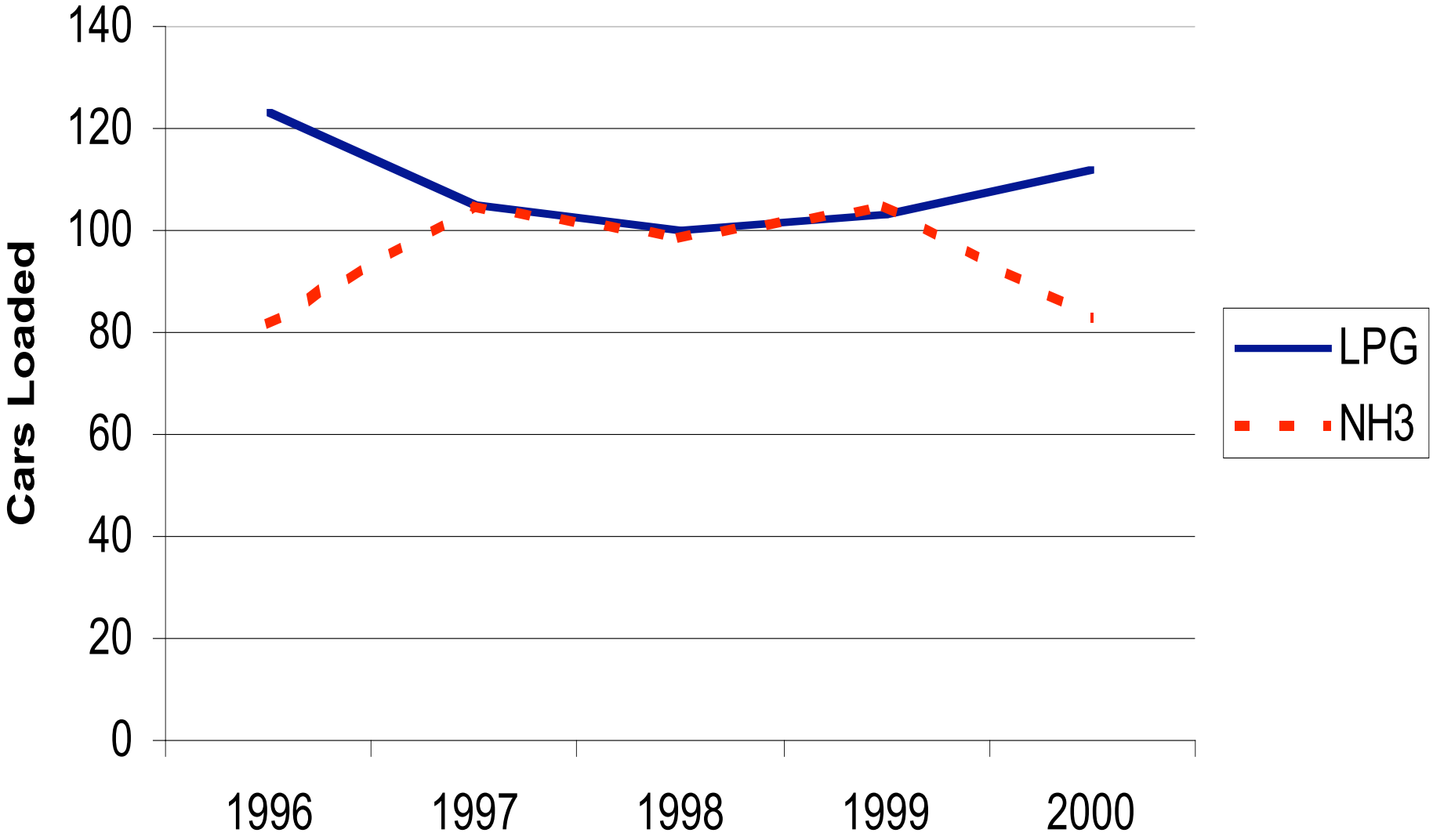
Top 15 Non-Accident Releases 1999



Top 15 Non-Accident Releases 2000



2000 NAR data estimates



Tank Cars Involved in Non-Accident Releases

	Ammonia	Phos.Acid
1994	81	90
1995	85	46
1996	66	23
1997	81	33
1998	62	22
1999	82	14
2000	56	13

- ***81% of the known sources of NAR's were due to <u>Loose</u> or <u>Defective fittings</u>.***

- ***15% of the known sources of NAR's were from <u>Pressure Relief Valves</u>***

In the Year 2000 there were 22,563 shipments of Phosphoric Acid with 13 reported leaking.

5 Broken Frangible Disk
1 Safety valve
1 Loose Blind Flange
1 Loose Bottom Outlet Cap
2 Loose Bottom Outlet Connectors
2 Loose Bottom Outlet Valve
1 Missing Bottom Outlet Gasket

In the Year 2000 there were 31,189 shipments of Anhydrous Ammonia with 56 reported leaking.

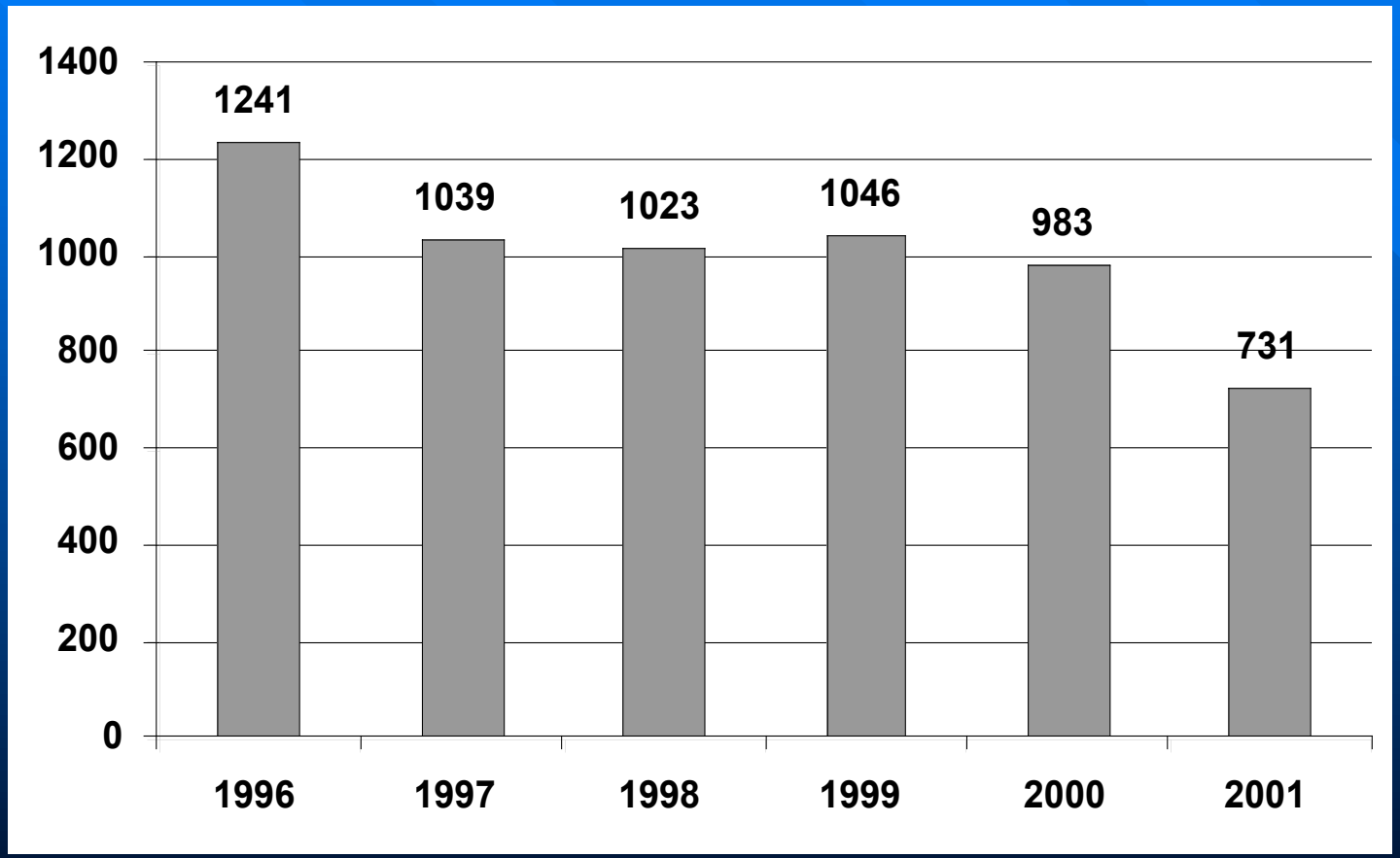
- 18 Loose or missing plugs
- 11 Leaking Pressure Relief Valves
- 13 Loose or leaking Liquid or vapor valves
- 20 Loose Packing Glands
- 2 Loose Gauging Device Assemblies
- 2 Cracked sample lines and leaking valve
- 2 Thermowell leaks
- 9 Loose or broken Manway cover plates

Non-Accident Releases from Tank Cars 2001 Data Summary

NAR Reduction Task Force
Alexandria, VA
April 24, 2002

Tank Cars Leaking Annually

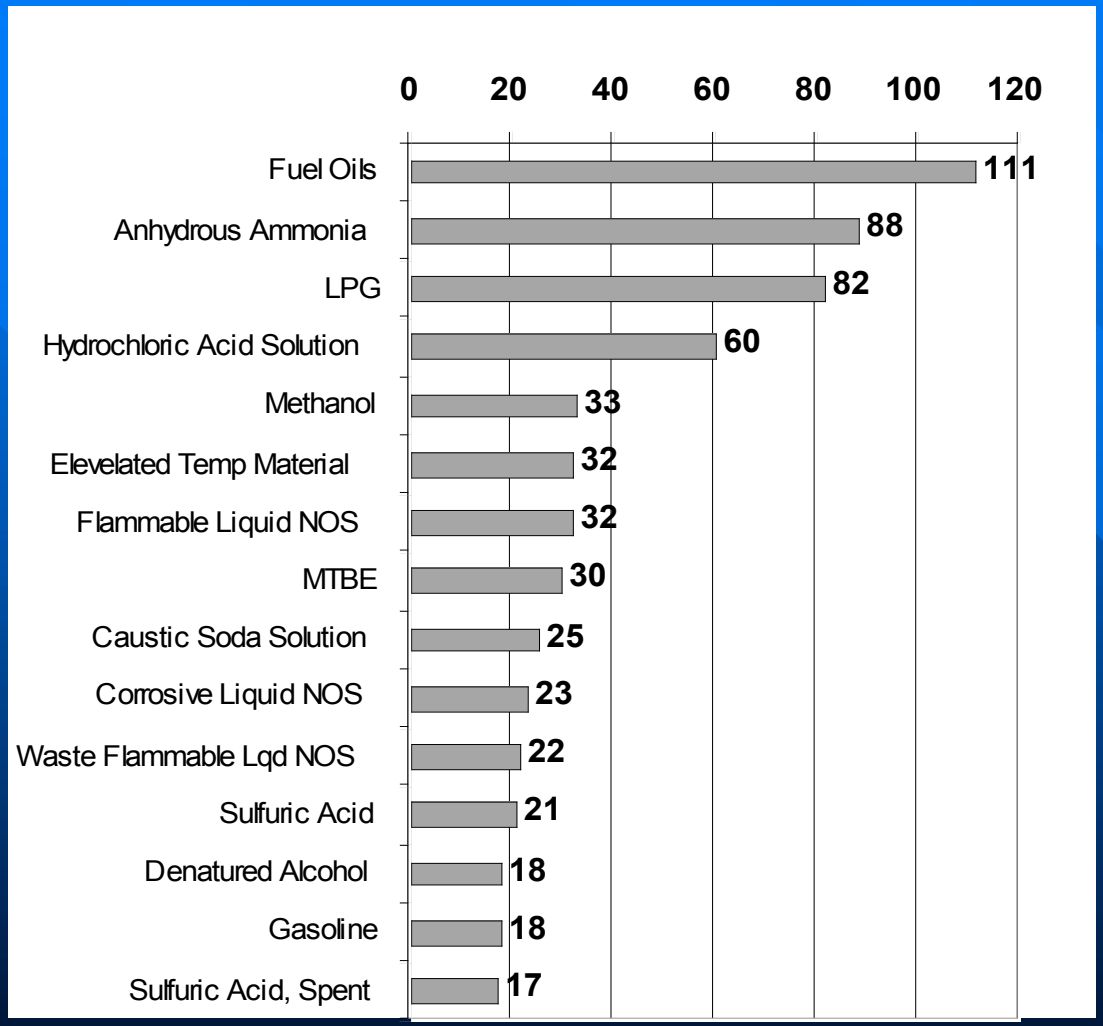
US & Canada, Loaded & Empty

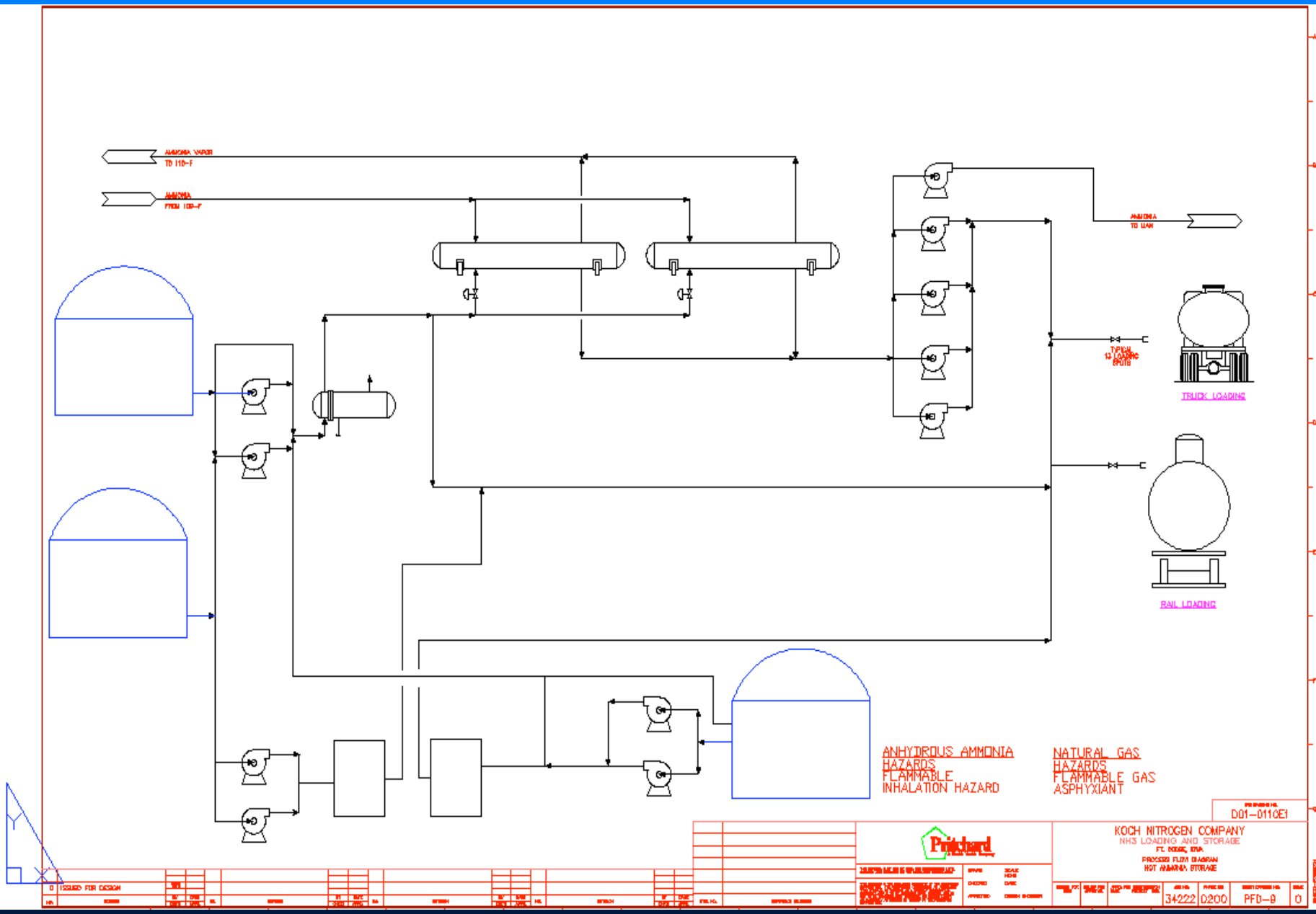


731 is a 41% decrease from the peak of 1,241

Top 15 Commodities by 2001 NAR Frequency

U S& Canada; Loaded & Empty

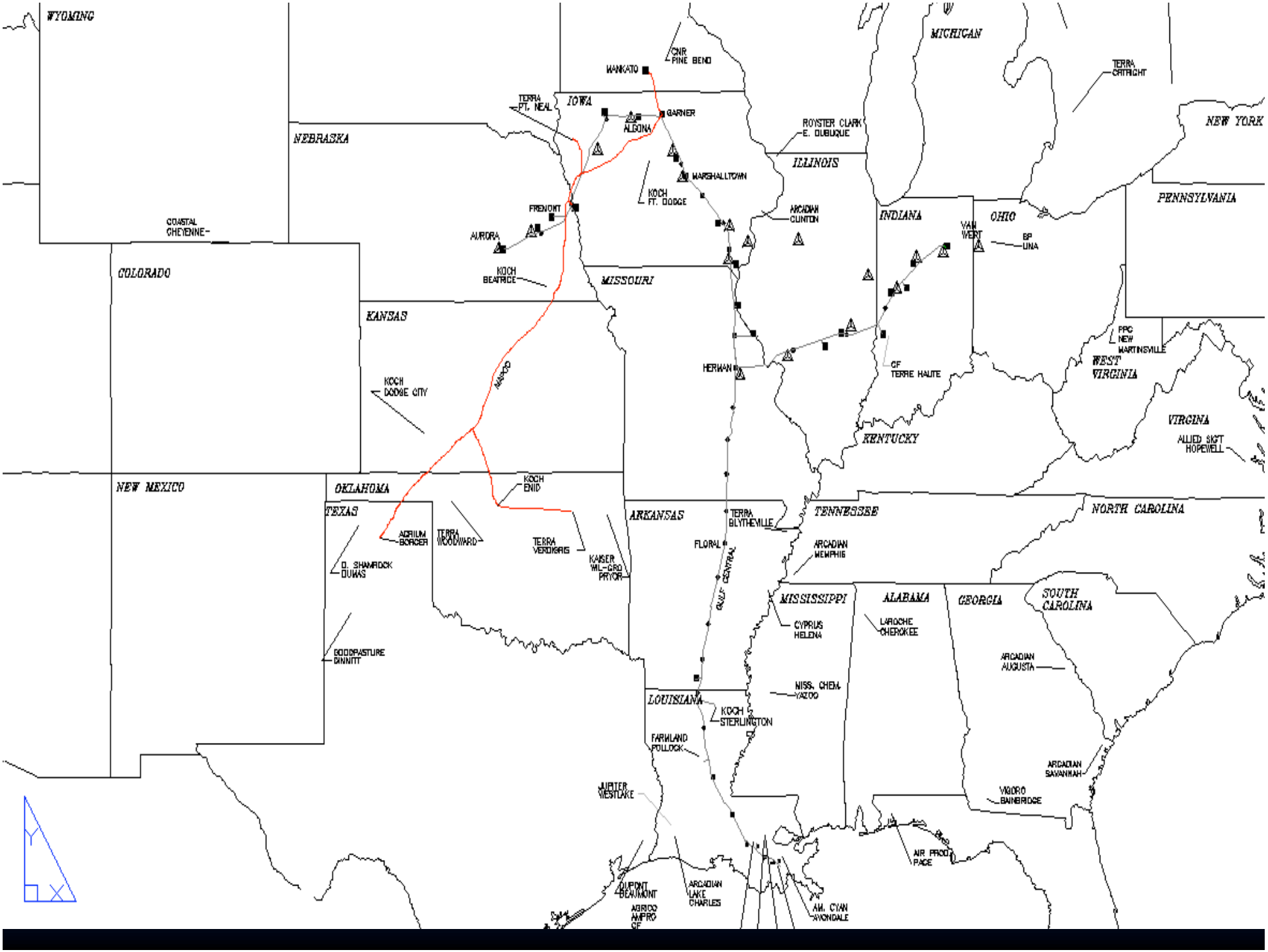



AMMONIA VAPOR
TO 110-F
AMMONIA
FROM 100-F
AMMONIA
TO WAH
TRUCK LOADING
RAIL LOADING
ANHYDROUS AMMONIA
HAZARDS
FLAMMABLE
INHALATION HAZARD
NATURAL GAS
HAZARDS
FLAMMABLE GAS
ASPHYXIANT
D01-0110E1
Pritchard
KOCH NITROGEN COMPANY
NH3 LOADING AND STORAGE
FT. DODGE, IOWA
PROCESS FLOW DIAGRAM
HOT AMMONIA STORAGE
D ISSUED FOR DESIGN
34222
D200
PFD-9
0

- Hazmat employees have required training every three years for loading and unloading of ammonia.
- Some means of remote cut offs required for truck loading, smart hose, remote electronic shut off etc…
- Hoses are required to be dated and pressure checked

- Rail and truck DOT, water ways include Coast Guard regulations as well as DOT
- Security plans are required

- MI on the piping transitions between underground and surface piping, (Williams pipeline was proactively changing out just to be sure.)
- Pipeline roughly about every 10 miles pipeline comes out of the ground with remote operated valves. Fenced off area, connected to pipeline control network.


WYOMING
NEBRASKA
COLORADO
KANSAS
NEW MEXICO
OKLAHOMA
TEXAS
IOWA
MISSOURI
ARKANSAS
LOUISIANA
ILLINOIS
MICHIGAN
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
MAINKATO
CNR PINE BEND
TERRA PT. NEAL
ALGONA
GARNER
ROYSTER CLARK E. DUBUQUE
MARSHALLTOWN
KOCH FT. DODGE
FREMONT
AURORA
KOCH BEATRICE
ARCADIAN CLINTON
COASTAL CHEYENNE
KOCH DODGE CITY
MAPCO
HERMAN
CF TERRE HAUTE
VAN WERT
BP LIMA
TERRA CATTIGHT
PPG NEW MARTINSVILLE
ALLIED SIGT HOPEWELL
KOCH ENID
AGRIUM BORGER
TERRA WOODWARD
TERRA VERDIGRIS
KAISER WIL-GRO PRYOR
D. SHAMROCK DUMAS
BOODPASTURE DINNITT
TERRA BLYTHEVILLE
FLORAL
GULF CENTRAL
ARCADIAN MEMPHIS
CYPRUS HELENA
LAROCHE CHEROKEE
ARCADIAN AUGUSTA
NISS. CHEM. VAZOO
KOCH STERLINGTON
FARMLAND POLLOCK
JUPITER WESTLAKE
DUPONT BEAUMONT
AGRICO AMPRO CF
ARCADIAN LAKE CHARLES
AM. CYAN AVONDALE
AIR PROD PACE
ARCADIAN SAVANNAH
VIGORO BAINBRIDGE