Georgia Commodity Flow Study

Interstate 20

June 9-10, 2010

Prepared by

U.S. Department of Energy

Office of Environmental Management

Office of Packaging and Transportation

July 30, 2010

INDEX

SUMMARY

The Department of Energy is a substantial shipper of hazardous materials, including over 10,000 shipments per year of radioactive materials, some of which travel along Interstate 20 through Georgia. The Department is committed to providing information on its transportation activities to its stakeholders.

The purpose of this commodity flow study is to help the State of Georgia, the Emergency and Operations Division of Columbia County, and area citizens more clearly understand what hazardous commodities are being shipped near, or through their environment for planning purposes. Information provided by this study is also intended to serve as a tool for identifying Emergency Response needs and to aid the state and the local communities in understanding and determining the risks involved with the shipment of hazardous materials and the potential impacts of these shipments to their state and community, and to state and local resources.

A highway Commodity Flow Survey was conducted on June 9-10, 2010 in Columbia County along Interstate 20. The survey was conducted over a 24-hour period by the Department of Energy (DOE) Office of Packaging and Transportation in partnership with the Georgia Emergency Management Agency, the Georgia Department of Public Safety, the Columbia County Emergency and Operations Division, and with the cooperation and assistance of local agencies and volunteers.

The survey location was the Georgia Department of Public Safety weigh stations, east and west bound, located along I-20 near Milepost 187. Illuminated highway signs were posted at the weigh stations advising all vehicles carrying hazardous material (HAZMAT) to keep to the right at the weigh station. Commercial vehicles were required by state patrol to pass through the stations. HAZMAT vehicles were directed to proceed to a safe area of the weigh station for the survey. Vehicle information, HAZMAT placard information, and time were recorded. Also, detailed information on individual commodities, weights, and commodity origin/destination was recorded from shipping papers.

During the survey, approximately 6,100 commercial vehicles passed through the weigh stations. Of these, 336 HAZMAT vehicles (174 eastbound/162 westbound) were recorded with 404 loads and 139 different hazardous materials. Also, over 6.39 million pounds of hazardous materials shipments were recorded.

Survey results indicate that the direction of hazardous material vehicles observed during the survey was relatively balanced with approximately 48% eastbound and 52% westbound. However, the weights of materials were unbalanced with westbound traffic carrying about twice the total weight of eastbound traffic. About 55% percent of the 404 loads were either HAZMAT Class 8 (Corrosive) or Class 3 (Flammable Liquid) materials. About 75% of the total tonnage was moved, in bulk, by tank trailer. Interstate traffic accounted for about 70% of the total HAZMAT traffic.

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
9:08	East	30' Truck	Dangerous	GA-GA	Nonflammable Gas	1950	Aerosol dispensers	Aerosols	126		
			8		Corrosive	3266	Corrosive liquid, basic, inorganic, NOS	Corrosive Liquid	154		
9:14	East	Van	2.3	Unknown	Toxic Gas	1040	Ethylene oxide	Ethylene Oxide	119P	5,200	13-400 lb drums
			3		Flammable Liquid	1280	Propylene oxide	Propylene Oxide	127P	300	1-drum
9:24	West	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	40,000	Full load
9:25	West	Flat Bed	8	GA-GA	Corrosive	2209	Formaldehyde solutions	Formaldehyde	132		
9:29	East	Flat Bed	3	GA-GA	Flammable Liquid	1133	Adhesives (flammable)	Adhesives	128	30	
9:35	East	MC338	2.2	Unknown	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120		Did Not Stop
9:44	West	MC307	8	GA-OH	Corrosive	3265	Corrosive liquid, acidic, organic, NOS	Alkylbenzine Sulfonic Acid	153	45,000	
9:47	West	MC338	2.2	SC-GA	Nonflammable Gas	1959	Argon, refrigerated liquid (cryogenic liquid)	Argon	120	47,500	Full load
9:47	West	MC338	2.2	SC-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	40,000	
9:50	West	Van	8	GA-GA	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	8,000	
9:55	East	Van	3	GA-NC	Flammable Liquid	1197	Extracts, flavoring, liquid	Extracts	127	1,450	
						3265	Corrosive liquid, acidic, organic, NOS	Citric Acid	153	2,830	
						1805	Phosphoric acid	Phosphoric Acid	154	6,224	
9:55	East	MC307	8	GA-NC	Corrosive	1805	Phosphoric acid	Phosphoric Acid	154	44,980	
10:00	East	MC307	8	GA-GA	Corrosive	3266	Corrosive liquid, basic, inorganic, NOS	Sodium Hydroxide	154	48,998	
10:02	East	Tube Trailer	2.3	TX-SC	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	45,620	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
10:08	West	Flat Bed	2.3	SC-TN	Toxic Gas	1017	Chlorine	Chlorine	124	22,000	chlorine cylinders
10:10	East	30' Truck	4.1	GA-SC	Flammable Solids	1325	Flammable solid, NOS	Flammable Solid	133	1,350	3-55 gal drums
					Flammable Liquid	1993	Combustible liquid, NOS	Combustible Liquid	128	800	2-55 gal drums
10:11	East	MC306	3	GA-NC	Flammable Liquid	1203	Petrol	Motor Oil	128	47,810	6500 gal
10:12	West	Van	9	GA-TN	Miscellaneous	3082	Hazardous waste, liquid, NOS	Hazardous Waste	171	3,080	
			9		Miscellaneous	3077	Hazardous waste, solid, NOS	Hazardous Waste	171	2,820	
10:15	East	Dry Bulk	5.1	Unknown	Oxidizing Substances	1942	Ammonium nitrate	Ammonium Nitrate	140		Did Not Stop
10:17	West	Tube Trailer	2.3	NC-TX	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	13,900	
10:20	East	MC312	8	Unknown	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154		Did Not Stop
10:20	East	MC307	3	Unknown	Flammable Liquid	3256	Elevated Temperature liquid, NOS	Road Tar	128		Did Not Stop
10:29	West	MC307	3	Unknown	Flammable Liquid	1266	Perfumery products with flammable solvents	Perfume	127	58,000	7000 gal
10:29	West	MC306	3	Unknown	Flammable Liquid	1203	Gasoline	Gasoline	128	54,650	9000 gal
10:32	West	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120		
10:33	West	MC306	3	SC-GA	Flammable Liquid	1993	Combustible liquid, NOS	Diesel	128	63,000	9000 gal
10:34	East	Flat Bed	3	FL-SC	Flammable Liquid	1993	Combustible liquid, NOS	Diesel	128	0	Empty
10:38	West	MC312	8	VA-GA	Corrosive	2922	Corrosive liquid, toxic, NOS	Arsenic Acid / Chromic Acid	154	0	Empty
10:38	West	MC312	8	VA-GA	Corrosive	2922	Corrosive liquid, toxic, NOS	Arsenic Acid / Chromic Acid	154	0	Empty
10:50	East	Unknown	2.2	Unknown	Nonflammable Gas				121		Did Not Stop
10:50	East	Van	Dangerous	GA-GA	Nonflammable Gas	1018	Refrigerant gas R-22	Chlorodifluoromethane	126	6,080	
10:50	West	Van	2.1	GA-GA	Flammable Gas	1075	Propane	Propane	115	5,760	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
10:54	East	30' Truck	8	GA-SC	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	1,980	
10:55	East	Tube Trailer	2.3	TX-NC	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	0	Empty
11:10	West	MC307	8	SC-GA	Corrosive	3266	Corrosive liquid, basic, inorganic, NOS	Sodium Hydroxide	154	45,012	
11:12	West	Van	8	GA-GA	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	4,000	
11:17	East	Van	2.1	Unknown	Flammable Gas				118		Did Not Stop
11:20	East	MC312	8	Unknown	Corrosive	2693	Bisulfites, aqueous solution, NOS	Sodium Bisulfite	154	0	Empty
11:20	East	MC306	3	GA-NC	Flammable Liquid	1203	Gasoline	Motor Oil	128	48,140	6500 gal
11:20	East	MC306	8	GA-GA	Corrosive	3265	Corrosive liquid, acidic, organic, NOS	Liquid Soap (acidic)	153	45,001	
11:21	East	Van	2.1	Unknown	Flammable Gas				118	4,210	1911 kg
			2.2		Nonflammable Gas				121	10,930	4961 kg
11:24	East	Van	1.1	IN-SC	Explosives	0006	Cartridges for weapons, with bursting charge	Weapons Cartridges	112	38,760	
11:27	East	MC312	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	0	Empty
11:30	West	MC306	3	SC-AL	Flammable Liquid	1306	Wood preservatives, liquid	Wood Preservatives	129	53,500	6500gal
11:32	East	MC306	3	GA-SC	Flammable Liquid	1203	Gasoline	Gasoline	128	0	Empty
11:35	East	Flat Bed	2.2	Unknown	Nonflammable Gas	1046	Helium, compressed	Helium	121	22	56 cylinders
			2.2		Nonflammable Gas	9268	Air, compressed	Air, compressed	121	950	11,818 CF
11:37	East	MC306	3	GA-SC	Flammable Liquid	1203	Gasoline	Gasoline	128	0	Empty
11:39	West	MC312	8	GA-TX	Corrosive	1789	Hydrochloric acid	Hydrochloric Acid	157	44,480	22.24 Tons
11:43	East	MC306	3	Unknown	Flammable Liquid	1993	Combustible liquid, NOS	Diesel	128	6,000	
11:44	West	MC307	8	GA-GA	Corrosive	3266	Corrosive liquid, basic, inorganic,	Corrosive	154	48,998	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
							NOS				
11:45	East	MC307	3	GA-SC	Flammable Liquid	1173	Ethyl acetate	Ethyl Acetate	129	39,291	
11:47	East	MC307	8	Unknown	Corrosive	1824	Sodium hydroxide, solution	Sodium Hydroxide	154	0	Empty
11:47	East	Van	2.2	GA-NC	Nonflammable Gas	1072	Oxygen, compressed	Oxygen	122	5,072	1021 cylinders
11:48	East	Van	5.1	GA-SC	Oxidizing Substances	2880	Calcium hypochlorite, hydrated, 5.5-16% water	Calcium Hypochlorite	140	14,000	
11:49	East	Van	6.1	GA-SC	Toxic Substance	2656	Quinolene	Quinolene	154	2,115	953.9kg
11:50	West	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	2,000	5% full
11:58	West	MC307	5.1	GA-AL	Oxidizing Substance	3139	Oxidizing liquid, NOS	Oxidizer (liquid)	140	46,680	
12:06	West	Flat Bed	9	SC-AL	Miscellaneous	3077	Hazardous waste, solid, NOS	Hazardous Waste	171	20,000	
12:07	East	MC307	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	0	Empty
12:10	West	Van	8	SC-GA	Corrosive	1805	Phosphoric acid	Phosphoric Acid	154		
12:11	West	MC307	5.1	GA-AL	Oxidizing Substance	3139	Oxidizing liquid, NOS	Ammonium Nitrate	140	47,000	
12:15	West	MC306	3	SC-GA	Flammable Liquid	1993	Combustible liquid, NOS	Motor Fuel	128	30,560	
			3		Flammable Liquid	1170	Ethyl alcohol	Ethanol	127	2,000	
			3		Flammable Liquid	1208	Hexanes	Naptha	128	6,220	
12:15	East	ISO Tank	8	TN-SC	Corrosive	2218	Acrylic acid, stabilized	Acrylic Acid	132P	0	Empty
12:19	West	MC312	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	49,000	
12:20	East	FB w/Tank	3	GA-GA	Flammable Liquid	1993	Combustible liquid, NOS	Diesel	128	1,400	200 gal
12:21	East	MC307	8	GA-GA	Corrosive	2672	Ammonium hydroxide, 10-35% Ammonia	Ammonium Hydroxide	154	0	Empty
12:25	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
12:26	West	MC307	9	GA-GA	Miscellaneous	3082	Hazardous waste, liquid, NOS	Hazardous Waste	171		
12:32	East	MC307	8	GA-GA	Corrosive	1824	Sodium hydroxide, solution	Sodium Hydroxide	154	0	Empty
12:38	West	Flat Bed	3	GA-GA	Flammable Liquid	1993	Combustible liquid, NOS	Combustible Liquid	128		
12:47	East	MC338	2.2	GA-SC	Nonflammable Gas	1073	Oxygen, refrigerated liquid (Cryogenic)	Oxygen	122	4,750	500 gal
12:49	East	MC306	8	TN-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	40,528	
13:05	West	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	40,000	
13:10	East	MC307	8	Unknown	Corrosive	2582	Ferric chloride, solution	Ferric Chloride	154	0	Empty
13:10	West	MC307	9	SC-AL	Miscellaneous	3077	Hazardous waste, solid, NOS	Hazardous Waste	171	45,180	
13:16	East	Flat Bed	2.2	Unknown	Nonflammable Gas	1072	Oxygen, compressed	Oxygen	122		Did Not Stop
13:23	West	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	45,490	
13:25	West	Flat Bed	7	SC-AZ	Radioactive	3327	Radioactive material, Type A package, fissile	Nuclear Fuel Rods	165	45,594	
13:25	East	MC307	8	Unknown	Corrosive	3266	Corrosive liquid, basic, inorganic, NOS	Corrosive Liquid	154		Did not Stop
13:27	West	MC306	3	Unknown	Flammable Liquid	1987	Alcohols, NOS	Alcohol	127		
13:28	West	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	39,580	
13:29	East	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	39,027	
13:34	West	MC307	3	GA-TN	Flammable Liquid	3256	Elevated temperature liquid, flammable, nos		129	43,700	
13:36	West	MC307	3	SC-GA	Flammable Liquid	1203	Gasoline	Fuel Oil	128	7,900	
13:37	East	MC307	9	AR-NC	Miscellaneous	3257	Elevated Temperature liquid, NOS	Tall Oil Acids	129	46,320	
13:43	East	FB w/Tank	8	GA-SC	Corrosive	2209	Formaldehyde solution	Formaldehyde	132		200 gal
13:46	West	MC307	3	SC-TX	Flammable Liquid	1100	Allyl chloride	Allyl Chloride	131	39,980	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
14:01	West	Flat Bed	3	GA-GA	Flammable Liquid	1993	Combustible liquid, NOS	Diesel	128	1,400	200gal
14:02	West	MC307	3	SC-MS	Flammable Liquid	1993	Combustible liquid, NOS	Waste flammable liquid	128	39,000	5582 gal
14:08	West	MC312	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	48,620	
14:10	East	MC331	2.2	GA-SC	Nonflammable Gas	1005	Ammonia, anhydrous	Ammonia	125	24,580	
14:12	West	MC338	2.2	GA-MS	Nonflammable Gas	1951	Argon, refrigerated liquid (cryogenic liquid)	Argon	120	47,080	
14:13	East	Tube Trailer	2.1	LA-SC	Flammable Gas	1049	Hydrogen, compressed	Hydrogen	115		
14:13	West	MC307	8	SC-LA	Corrosive	2738	N-Butylaniline	N-Butylaniline	153	37,900	
14:15	East	MC307	8	GA-GA	Corrosive	3265	Corrosive liquid, acidic, organic, NOS	Alkylbenzinesulfonic Acid	153	44,990	20412 kg
14:15	West	MC306	3	SC-GA	Flammable Liquid	1203	Gasoline	Gasoline	128	51,620	8500 gal
14:17	West	MC312	8	SC-GA	Corrosive	2923	Corrosive solid, toxic, NOS	Arsenic Acid	154	48,020	
14:18	West	MC338	2.2	GA-GA	Nonflammable Gas	1977	Nitrogen, refrigerated liquid (cryogenic liquid)	Nitrogen	120	50,938	703,087 CF
14:20	East	MC312	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	49,280	
14:21	East	MC312	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	48,860	
14:25	East	Van	8	GA-SC	Corrosive	1824	Sodium hydroxide, solution	Sodium Hydroxide	154	26,461	
14:29	East	MC312	2.2	TN-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
14:30	East	MC331	2.2	Unknown	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
14:35	East	MC307	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	20,420	
14:45	East	Van	8	GA-GA	Corrosive	3266	Corrosive liquid, basic, inorganic, NOS	Corrosive Liquid	154	41,006	
14:45	East	Van	1.3	Unknown	Explosives			Explosives	112		Did Not Stop

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
14:48	West	Van	5.1	NC-TX	Oxidizing Substance	1463	Chromic acid, solid	Chromium Trioxide	141	43,317	
14:53	West	MC306	3	GA-GA	Flammable Liquid	1203	Gasoline	Octane	128	60,000	
14:58	East	Tube Trailer	2.3	TX-NC	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	0	Empty
14:59	East	MC306	3	GA-SC	Flammable Liquid	1203	Gasoline	Diesel	128	0	Empty
14:59	East	Van	1.4	CA-SC	Explosives	0337	Fireworks	Fireworks	114	28,074	
15:09	West	MC307	8	SC-GA	Corrosive	1824	Sodium hydroxide, solution	Sodium Hydroxide	154	0	Residue Only
15:10	West	Rolloff	9	SC-AL	Miscellaneous	3077	Hazardous waste, solid, NOS	Hazardous Waste	171	28,755	
15:14	West	Van	8	SC-GA	Corrosive	3265	Corrosive liquid, acidic, organic, NOS	Corrosive Liquid	153	39,345	17,851 kg
15:20	East	Van	2.1	GA-GA	Flammable Gas	1075	Liquefied petroleum gas	Propane	115	5,760	288-20 lb cylinders
15:28	East	Van	8	GA-SC	Corrosive	3264	Corrosive liquid, acidic, inorganic, NOS	Neodymium Nitrate	154	1,375	
15:35	West	MC307	3	NC-AR	Flammable Liquid	1274	Propyl alcohol, normal	n-Propanol	129	30,339	4524 gal
			3		Flammable Liquid	1276	Propyl acetate	n-Propyl Acetate	129	15,360	2093 gal
15:56	East	MC307	3	MS-SC	Flammable Liquid	1993	Combustible liquid, NOS	Xylene/Toluene	128	39,600	5454 gal
15:59	East	MC312	3	MS-SC	Flammable Liquid	1993	Combustible liquid, NOS	Xylene/Toluene	128	41,313	5690 gal
15:59	East	MC307	8	TX-SC	Corrosive	2218	Acrylic acid, stabilized	Acrylic Acid	132P	44,961	
16:00	East	MC312	6.1	GA-NC	Toxic Substance	2922	Corrosive liquid, poisonous, NOS	Arsenic Acid / Chromic Acid	154	48,000	
16:02	East	MC306	3	Unknown	Flammable Liquid	1203	Gasoline	Gasoline	128		Did Not Stop
16:04	East	MC306	3	Unknown	Flammable Liquid	1203	Gasoline	Gasoline	128		Did Not Stop
16:10	West	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	39,620	
16:11	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
16:21	West	MC331	2.2	SC-GA	Nonflammable Gas	1005	Ammonia, anhydrous, liquefied	Ammonia	125	10,500	
16:22	East	MC331	2.2	Unknown	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120		Did Not Stop
16:24	West	MC331	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	49,180	
16:30	West	MC307	9	NC-GA	Miscellaneous	3082	Hazardous waste, liquid, NOS	Ethylene Glycol	171	49,180	
16:32	West	MC306	3	SC-GA	Flammable Liquid	1203	Gasoline	Gasoline	128	55,030	8806 gal
16:34	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	39,476	
16:40	West	MC338	2.2	GA-TN	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	41,800	
16:58	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
17:06	East	MC307	9	GA-GA	Miscellaneous	3082	Hazardous waste, liquid, NOS	Paranonyl Phenol	171	4,500	
17:07	East	MC307	8	GA-GA	Corrosive	3266	Corrosive liquid, basic, inorganic, NOS	Sodium Hydroxide	154	48,998	
17:15	East	Dry Bulk	5.1	AL-SC	Oxidizing Substances	1942	Ammonium nitrate	Ammonium Nitrate	140	48,500	
17:15	West	Van	1.3	NC-OH	Explosives	0246	Ammunition, smoke, white phosphorus	Ammunition	112		
17:18	West	Dry Bulk	5.1	GA-AL	Oxidizing Substance	1942	Ammonium nitrate	Ammonium Nitrate	140	46,000	
17:20	West	MC312	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	49,040	
17:21	East	Van	8	GA-SC	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	1,094	
17:21	West	MC307	8	NC-GA	Corrosive	1805	Phosphoric acid	Phosphoric Acid	154	45,380	
17:23	East	MC307	8	GA-GA	Corrosive	3266	Corrosive liquid, basic, inorganic, NOS	Tetrapotassium phosphate	154	0	Empty
17:25	East	Tube Trailer	2.3	TX-GA	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	45,420	
17:30	West	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	40,220	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
17:35	East	Van	3	GA-SC	Flammable Liquid	1268	Petroleum distillates, NOS	Waste Petroleum Distillates	128	10,915	20 Drums
			3		Flammable Liquid	1263	Paint related material	Paint	128	23,205	
17:42	West	MC312	8	SC-AL	Corrosive	1783	Hexamethylenediamine, solution	Hexamethylenediamine	153	0	Empty
17:44	East	MC307	8	TN-SC	Corrosive	2218	Acrylic acid, stabilized	Acrylic Acid	132P	45,560	
17:45	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
17:46	West	Tube Trailer	2.3	NC-TX	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	14,700	
17:47	East	MC306	3	GA-SC	Flammable Liquid	1203	Gasoline	Gasoline	128	0	Empty
17:48	West	Tube Trailer	2.1	SC-LA	Flammable Gas	1049	Hydrogen, compressed	Hydrogen	115		
17:49	East	Van	3	TN-SC	Flammable Liquid	1993	Combustible liquid, NOS	Toluene	129	795	2-55gal Drums
			3		Flammable Liquid	1120	Butanols	Butyl Alcohol	129	540	80 gal
			6.1		Toxic Substance	1897 1593	Tetrachloroethylene / Methylene Chloride	Tetrachloroethylene/ Methylene Chloride	160	690	1-55gal Drum
			3		Flammable Liquid	1993	Combustible liquid, NOS	Xylene	128	4,058	10 containers - 559 gal
			9		Miscellaneous	3077	Hazardous waste, solid, NOS	Arsenic/Barium/Lead Waste	171		
17:52	East	MC307	3	TX-GA	Flammable Liquid	3256	Elevated Temperature liquid, NOS	Dimethylpropane	128	42,380	
17:56	East	Van	3	MS-NC	Flammable Liquid	1993	Combustible liquid, NOS	Xylene	128	32,060	4416 gal
18:03	East	MC312	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	0	Empty
18:07	West	Van	3	SC-CA	Flammable Liquid	1280	Propylene oxide	Propylene Oxide	127P	35,136	
18:09	East	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
18:30	East	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
18:30	East	MC306	3	GA-SC	Flammable Liquid	1203	Gasoline	Gasoline	128	0	Empty

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
18:31	East	MC312	2.2	KS-SC	Nonflammable Gas	1963	Helium, refrigerated liquid (cryogenic liquid)	Helium	120	10,000	
18:36	West	Flat Bed	2.2	GA-LA	Nonflammable Gas	1006	Argon, compressed	Argon	121	1,600	
			2.2		Nonflammable Gas	1002	Air, compressed	Air	122	1,600	
18:47	West	MC306	8	Unknown	Corrosive	1805	Phosphoric acid	Phosphoric Acid	154	0	Empty
18:52	East	MC306	9	GA-SC	Miscellaneous	3082	Hazardous waste, liquid, NOS	Mixed Phthalic Wastes	171	0	Empty
19:00	West	ISO Tank	8	SC-TX	Corrosive	3265	Corrosive liquid, acidic, organic, NOS	Phosphonobutane Tricarboxylic Acid	153	48,457	
19:03	East	MC306	8	GA-GA	Corrosive	3265	Corrosive liquid, acidic, organic, NOS	Alkylbenzinesulfonic Acid	153	44,900	
19:04	West	Van	7	SC-TN	Radioactive	3321	Radioactive material, LSA-II	Radioactive Material	162	12,840	
19:10	West	MC307	3	SC-LA	Flammable Liquid	3295	Hydrocarbons, liquid, NOS	Petroleum Naptha - Benzene	128	0	Empty
19:15	West	Flat Bed	2.3	NC-GA	Toxic Gas	1017	Chlorine	Chlorine	124		200 cylinders
			2.2		Nonflammable Gas	1006	Argon, compressed	Argon	121		of all gases
			2.2		Nonflammable Gas	1046	Helium, compressed	Helium	121		
			2.3		Toxic Gas	1079	Sulfur Dioxide	Sulfur Dioxide	125		
			2.1		Flammable Gas	1075	Propane	Propane	115		
			2.3		Nonflammable Gas	1072	Oxygen, compressed	Oxygen	122		
19:20	East	Van	8	GA-SC	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	1,288	
			2.2		Nonflammable Gas	3159	Refrigerant gas R-134a	1,1,1,2-Tetrafluoroethane	126	31	
19:35	West	Van	8	SC-GA	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	41,173	
19:40	East	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
19:45	East	MC307	8	GA-GA	Corrosive	2693	Bisulfites, aqueous solution, NOS	Sodium Bisulfite	154	0	Empty

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
19:46	West	MC306	3	SC-GA	Flammable Liquid	1993	Combustible liquid, NOS	Naptha	128	11,625	1700 gal
19:47	West	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	40,280	
19:55	West	Van	2.2	SC-GA	Nonflammable Gas	1006	Argon, compressed	Argon	121		
20:03	East	MC312	5.1	GA-GA	Oxidizing Substances	3139	Oxidizing liquid, NOS	Ammonium Nitrate	140		Empty
20:09	West	Van	4.1	SC-GA	Flammable Solid	1325	Flammable solid, NOS	Perfume	133		
20:14	West	MC312	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	48,960	
20:15	West	MC307	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	49,880	404,225 CF
20:25	West	Dry Bulk	5.1	GA-AL	Oxidizing Substance	1942	Ammonium nitrate	Ammonium Nitrate	140	45,440	
20:29	West	Van	9	SC-GA	Miscellaneous	3363	Dangerous goods in machinery	Dangerous goods	171	16,270	
20:30	East	MC306	3	GA-SC	Flammable Liquid	1203	Gasoline	Gasoline	128	0	Empty
20:30	West	MC312	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	46,780	
20:30	West	MC312	2.1	GA-TN	Flammable Gas	1075	Liquefied petroleum gas	LPG	115	25,000	
20:31	West	MC307	3	NC-GA	Flammable Liquid	1170	Ethyl alcohol	Ethanol	127	42,200	6404 gal
20:35	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
20:37	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
20:45	West	MC312	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	21,120	
20:54	East	Tube Trailer	2.3	TX-NC	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	0	Empty
20:57	East	MC307	8	AL-SC	Corrosive	2693	Bisulfites, aqueous solution, NOS	Sodium Bisulfite	154	44,600	
21:00	West	Van	3	GA-IL	Flammable Liquid	1169	Extracts, aromatic, liquid	Extracts	127		
21:15	West	Van	8	GA-GA	Corrosive	2699	Trifluoroacetic acid	Trifluoroacetic Acid	154	1,429	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
			2.2		Nonflammable Gas	1018	Refrigerant gas R22	Chlorodifluoromethane	126	2,800	
			2.2		Nonflammable Gas	1046	Helium, compressed	Helium	121		
21:17	West	ISO Tank	2.3	NC-TX	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	14,340	
21:25	West	ISO Tank	2.3	NC-TX	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	13,740	
21:25	West	Dry Bulk	5.1	GA-GA	Oxidizing Substance	1942	Ammonium nitrate	Ammonium Nitrate	140		
21:30	West	Van	3	SC-GA	Flammable Liquid	1133	Adhesives (flammable)	Adhesives	128	1,870	
21:33	West	Van	8	GA-GA	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	3,000	
21:33	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
21:36	East	MC307	8	GA-SC	Corrosive	1824	Sodium hydroxide, solution	Sodium Hydroxide	154	24,938	
21:42	East	MC307	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	0	Empty
21:45	West	Van	8	GA-GA	Corrosive	1814	Potassium hydroxide, solution	Potassium Hydroxide	154	1,625	
21:47	West	Van	8	GA-GA	Corrosive	1760	Corrosive liquid, NOS	Cleaning Compound	154	1,650	
21:53	West	MC306	3	SC-GA	Flammable Liquid	1203	Gasoline	Diesel	128	54,965	7852 gal
22:05	West	ISO Box	9	SC-TN	Corrosive	2923	Corrosive solid, toxic, NOS	Tolcide MBT	154	12,676	
22:09	East	MC307	3	FL-SC	Flammable Liquid	1866	Resin solution	Resins	127	40,000	
22:10	West	MC307	3	SC-TN	Flammable Liquid	1993	Combustible liquid, NOS	Combustible Liquid	128	32,480	
22:11	East	MC338	2.1	LA-NC	Flammable Gas	1966	Hydrogen, refrigerated liquid (cryogenic liquid)	Hydrogen	115	6,000	
22:15	West	MC307	3	SC-GA	Flammable Liquid	1203	Gasoline	Gasoline	128	50,400	7200 gal
						1170	Ethyl alcohol	Ethanol	127	5270	801 gal
22:18	East	MC307	8	TX-GA	Corrosive	3266	Corrosive liquid, basic, inorganic, NOS	Sodium Hydroxide Sulfide	154	0	Empty

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
21:36	East	MC307	8	GA-SC	Corrosive	3266	Corrosive liquid, basic, inorganic, NOS	Sodium Hydroxide Sulfide	154	0	Empty
22:20	West	ISO Tank	9	SC-GA	Miscellaneous	3082	Hazardous waste, liquid, NOS	Isononylphenol-Ethoxylate	171		
22:30	West	Van	8	GA-GA	Corrosive	2699	Trifluoroacetic acid	Trifluoroacetic Acid	154	10,406	
22:40	West	Van	3	SC-GA	Flammable Liquid	1210	Printing ink, flammable	Printing Ink	129	1,254	
22:45	West	Van	8	GA-GA	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	155	
			3		Flammable Liquid	1268	Petroleum products, NOS		128	1,124	
			3		Flammable Liquid	1993	Combustible liquid, NOS	Combustible Liquid	128	1,046	
22:46	West		8	Unknown	Corrosive				153		Did Not Stop
22:46	West	Van	5.1	NC-GA	Oxidizing Substance	1463	Chromium trioxide, anhydrous	Chromium Trioxide	141	43,828	
22:47	East	MC338	2.1	Unknown	Flammable Gas	1966	Hydrogen, refrigerated liquid (cryogenic liquid)	Hydrogen	115		Did not Stop
22:47	West	Tube Trailer	2.3	NC-TX	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	14,300	
22:50	West	Van	8	GA-GA	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	4,832	
22:57	East	MC306	3	GA-SC	Flammable Liquid	1203	Gasoline	Gasoline	128	0	Empty
22:58	West	Van	3	SC-GA	Flammable Liquid	1993	Combustible liquid, NOS	Benzyl Alcohol	128	2,400	
22:58	East	Van	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	14,000	
			8		Corrosive	1830	Sulfuric acid	Sulfuric Acid	137	7,888	
22:58	East	MC312	8	TN-GA	Corrosive	1819	Sodium aluminate, solution	Sodium Aluminate	157	48,000	
23:04	West	Van	3	SC-GA	Flammable Liquid	1219	Isopropyl alcohol	Isopropanol	129	785	
23:04	East	Van	9	GA-SC	Miscellaneous	3082	Hazardous waste, liquid, NOS	Epoxy Resin	171	3,350	1519.9 kg
23:05	East	Van	8	GA-NC	Corrosive	3265	Corrosive liquid, acidic, organic,	Corrosive Liquid	153	5,500	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
							NOS				
23:06	West	ISO Box	9	SC-GA	Miscellaneous	3363	Dangerous goods in machinery	Dangerous goods	171	12,000	
23:10	West	MC306	3	SC-GA	Flammable Liquid	1203	Gasoline	Diesel	128	52,500	7500 gal
23:10	East	MC306	3	GA-SC	Flammable Liquid	1203	Gasoline	Gasoline	128	0	Empty
23:11	West	Van	8	SC-GA	Corrosive	3265	Corrosive liquid, acidic, organic, NOS	Photo Acid	153	68	
23:11	East	MC307	9	AL-SC	Miscellaneous	3082	Hazardous waste, liquid, NOS	Bisphenol Epoxy Resin	171	40,220	
23:13	West	Tube Trailer	2.3	NC-TX	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	13,140	
23:14	West	MC307	6.1	SC-TX	Toxic	3281	Metal carbonyls, liquid, NOS	Metal Carbonyl	151	44,840	
23:25	West	Van	2.1	SC-GA	Flammable Gas	1040	Ethylene oxide	Ethylene Oxide	119P	274	
23:28	West	MC312	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	41,960	
23:44	West	Dry Bulk	5.1	GA-TN	Oxidizing Substance	1942	Ammonium nitrate	Ammonium Nitrate	140	48,560	
23:51	West	Tube Trailer	2.3	NC-TX	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	12,000	
0:20	West	Tube Trailer	2.3	NC-TX	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	12,540	
0:21	West	MC306	3	SC-GA	Flammable Liquid	1203	Gasoline	Diesel	128	55,035	7862 gal
0:22	East	Van	8	GA-SC	Corrosive	1824	Sodium hydroxide, solution	Sodium Hydroxide	154	4,313	
			8		Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	3,698	
			8		Corrosive	1759	Corrosive solid, NOS	Sodium Hydroxide	154	2,215	
0:29	West	Van	1.4	SC-GA	Explosives	0336	Explosives	Fireworks	114	2,656	
			3		Flammable Liquid	1263	Paint related material (flammable)	Paint	128	88	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
			9		Miscellaneous	3082	Hazardous waste, liquid, NOS	Hazardous Waste	171		
0:30	West	Van	8	GA-GA	Corrosive	1814	Potassium hydroxide, solution	Potassium Hydroxide	154	444	
			8		Corrosive	2672	Ammonium hydroxide	Ammonium Hydroxide	154	5,772	
			8		Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	1,776	
			8		Corrosive	3265	Corrosive liquid, acidic, organic, NOS	Citric Acid	153	2,276	
0:36	East	Van	2.2	GA-SC	Nonflammable Gas	1018	Refrigerant gas R-22	Chlorodifluoromethane	126	3,151	
0:39	West	ISO Tank	8	SC-GA	Corrosive	3265	Corrosive liquid, acidic, organic, NOS	1,2,4-Tricarboxylic Acid	153	48,457	
0:55	West	Van	2.1	SC-AL	Flammable Gas	1950	Aerosols dispensers	Aerosols	126	17,400	
1:10	West	MC312	8	GA-GA	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	46,481	
1:21	West	MC306	3	SC-GA	Flammable Liquid	1203	Gasoline	Gasohol	128	45,520	7497 gal
1:22	West	Van	8	NC-GA	Corrosive	1823	Sodium hydroxide, solid	Liquid Cleaner	154	2,406	
1:22	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
1:28	West	MC312	8	GA-TN	Corrosive	1819	Sodium aluminate, solution	Sodium Aluminate	154	4,808	
1:33	East	Tube Trailer	2.3	TX-NC	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	0	Empty
1:40	East	MC306	3	GA-SC	Flammable Liquid	1203	Gasoline	Diesel	128	0	Empty
1:46	East	Tube Trailer	2.3	TX-NC	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	0	Empty
1:50	East	Van	3	GA-SC	Flammable Liquid	1993	Combustible liquid, NOS	Heptane/Isopropanol	129	351	
			8		Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	1,379	
1:53	East	Tube Trailer	2.2	LA-SC	Toxic Gas	1016	Carbon monoxide, compressed	Carbon Monoxide	119		

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
1:55	East	Van	9	GA-SC	Miscellaneous	3082	Environmentally hazardous substance, liquid, NOS	Antimony Wastes	171	3,986	
1:57	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
1:57	West	MC338	2.2	SC-KS	Nonflammable Gas	1963	Helium, refrigerated liquid (cryogenic liquid)	Helium	120		
1:59	West	MC307	9	SC-GA	Miscellaneous	3257	Elevated temperature liquid, flammable, nos	Road Tar	128		
2:05	East	Van	6.1	GA-SC	Toxic	3351	Pyrethroid pesticide, liquid, poisonous, flammable	Pyrethrin	131	222	
2:16	East	Van	3	GA-SC	Flammable Liquid	1263	Paint related material (flammable)	Paint	128	509	
2:23	East	Van	3	GA-NC	Flammable Liquid	1263	Paint related material (flammable)	Paint	128	3,444	
			2.3		Toxic Gas	1017	Chlorine	Chlorine	124	6	
			5.1		Oxidizing Substances	2428	Sodium chlorate, aqueous solution	Sodium Chlorate	140	7,160	
2:30	East	Van	3	GA-SC	Flammable Liquid	1993	Combustible liquid, NOS	Cylosol Solvent	128	2,215	
2:41	West	Van	9	SC-GA	Miscellaneous	3082	Hazardous waste, liquid, NOS	Antimony Trioxide - Arsenic	171	1,493	
2:45	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
2:49	West	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	50,300	407605 CF
2:52	East	MC306	8	GA-NC	Corrosive	2491	Ethanolamine	Ethanolamine	153	47,000	
2:57	East	Van	8	GA-GA	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	1,048	
2:59	East	Van	2.2	GA-GA	Nonflammable Gas	3337	Refrigerant gas R404A	Refrigerant Gas R404A	126	2,671	
3:00	East	MC306	8		Corrosive	2582	Ferric chloride, solution	Ferric Chloride	154	0	Empty
3:00	East	Van	8	GA-NC	Corrosive	3264	Corrosive liquid, acidic, inorganic, NOS	Corrosive Liquid	154	9,690	
3:04	East	Van	3	GA-NC	Flammable Liquid	1263	Paint related material (flammable)	Paint	128	8,156	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
			8		Corrosive	1760	Corrosive liquid, NOS	Chlorinating Tabs	154	2,213	
			2.3		Toxic Gas	1017	Chlorine	Chlorine	124	262	
3:10	East	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
3:12	East	Van	1.2	Unknown	Explosives		Explosives	Explosives	112		Did Not Stop
3:45	West	Van	8	SC-GA	Corrosive	2796	Battery fluid, acid	Battery Fluid	157	0	Empty
			8		Corrosive	1790	Hydrofluoric acid	Hydrofluoric Acid	157	0	Empty
3:48	East	ISO Box	2.2	GA-NC	Flammable Gas	3161	Liquefied gas, flammable, NOS	Aerosols	115	17,077	2223+5496+29kg
			2.2		Flammable Gas	1950	Aerosol dispensers	Aerosols	126	1,527	693kg
3:52	East	MC306	3	GA-SC	Flammable Liquid	1203	Gasoline	Gasoline	128	0	Empty
4:04	West	Van	8	SC-GA	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	16,030	7272 kg
			6.1		Toxic Substance	2810	Toxic liquid, organic, NOS	Acrylamid / Formaldehyde	153	7,194	3264 kg
4:08	West	MC338	2.1	SC-LA	Flammable Gas	1966	Hydrogen, refrigerated liquid (crogenic liquid)	Hydrogen	115	0	Empty
4:08	East	Van	5.1	GA-SC	Oxidizing Substances	1505	Sodium Persulfate	Sodium Persulfate	140	15,854	
4:11	West	MC338	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	50,300	407,605 CF
4:18	East	Van	3	GA-SC	Flammable Liquid	1993	Combustible liquid, NOS	Combustible Liquid	128	2,000	
4:20	West	MC312	8	GA-AL	Corrosive	2582	Ferric chloride, solution	Ferric Chloride	154	32,100	
4:22	West	MC312	8	GA-AL	Corrosive	2582	Ferric chloride, solution	Ferric Chloride	154	45,000	
4:22	East	Van	8	GA-SC	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	2,500	
			8		Corrosive	2796	Sulfuric acid, with <50% acid	Sulfuric Acid	157	9	
			2.2		Flammable Gas	3159	Refrigerant gas R-134a	1,1,1,2-Tetrafluoroethane	126	115	
4:27	East	Van	8	GA-SC	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	11,333	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
			8		Corrosive	2796	Sulfuric acid, with <50% acid	Sulfuric Acid	157	102	
			2.2		Flammable Gas	3159	Refrigerant gas R-134a	1,1,1,2-Tetrafluoroethane	126	415	
4:31	West	MC312	8	GA-GA	Corrosive	1789	Hydrochloric acid, solution	Hydrochloric Acid	157	47,800	
4:55	East	Van	3	GA-SC	Flammable Liquid	1133	Adhesives (flammable)	Adhesives	128	138	
4:56	East	Van	8	GA-SC	Corrosive	1807	Phosphorus pentoxide	Phosphorus Pentoxide	137	9,185	
5:16	West	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	40,660	
5:19	West	MC306	3	SC-GA	Flammable Liquid	1203	Gasoline	Gasoline	128	20,044	3301 gal
			3		Flammable Liquid	1203	Diesel	Diesel	128	11,900	1700 gal
5:24	West	Van	Dangerous	SC-GA	Corrosive	3262	Corrosive Solid, basic, inorganic, NOS	Corrosive Solid	154	953	
5:30	West	Van	2.2	SC-GA	Nonflammable Gas	1044	Fire extinguishers with compressed gas	Fire Extinguishers	126	100	50
			3		Flammable Liquid	1263	Paint related material (flammable)	Paint	128	50	
5:34	West	MC312	8	GA-GA	Corrosive	1830	Sulfuric acid	Sulfuric Acid	137	45,000	
5:35	East	Tube Trailer	2.3	TX-NC	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125	0	Empty
5:44	West	MC312	8	GA-GA	Corrosive	2582	Ferric chloride, solution	Ferric Chloride	154	45,140	
5:46	West	MC307	8	GA-GA	Corrosive	1824	Sodium hydroxide, solution	Sodium Hydroxide	154	52,120	
6:00	East	Tube Trailer	2.3	Unknown	Toxic Gas	1859	Silicon tetrafluoride, compressed	Silicon Tetrafluoride	125		Did Not Stop
6:05	East	Van	8	GA-SC	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154	1659	
			5.2		Organic Peroxide	3109	Organic peroxide, type F, liquid	Organic Peroxide	145	976	
			3		Flammable Liquid	1987	Alcohol, NOS	Alcohol	127	33	
			8		Corrosive	1824	Sodium hydroxide, solution	Sodium Hydroxide	154	3,301	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
			2.1		Flammable Gas	1950	Aerosol dispensers	Aerosols	126	1	
6:07	East	Van	8	GA-GA	Corrosive	3266	Corrosive liquid, basic, inorganic, NOS	Sodium Hydroxide	154	2,500	
6:10	West	MC307	3	GA-TX	Flammable Liquid	1224	Ketones, liquid, NOS	3-Methyl-3-Penten-2-one	127	40,480	
6:10	East	Van	3	GA-SC	Flammable Liquid	1263	Paint related material (flammable)	Paint	128	1,700	
			8		Corrosive	2922	Corrosive liquid, poisonous, NOS	Paraquat	154	650	
			9		Miscellaneous	3082	Hazardous waste, liquid, NOS	Mankozeb	171	100	
			3		Flammable Liquid	1993	Combustible liquid, NOS	Xylene	128	120	
			9		Miscellaneous	3077	Hazardous waste, solid, NOS	Captan	171	600	
			8		Corrosive	1727	Ammonium bifluoride, solid	Ammonium Hydrogen Difluoride	154	8,000	
6:13	East	Van	8	GA-SC	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	7,513	
			2.1		Flammable Gas	1075	Petroleum gases, liquefied	Liquefied Petroleum Gas	115	750	
6:16	West	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	40,000	
6:17	East	Tube Trailer	2.1	TN-GA	Flammable Gas	1049	Hydrogen, compressed	Hydrogen	115		
6:22	East	Van	8	Unknown	Corrosive	1760	Corrosive liquid, NOS	Corrosive Liquid	154	5,616	
6:25	East	Van	3	GA-SC	Flammable Liquid	1263	Paint related material (flammable)	Paint	128	268	
6:26	West	Van	8	SC-GA	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	29,000	
6:27	East	Van	8	GA-SC	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	4450	
			8		Corrosive	2790	Acetic acid, solution, 10-80%	Acetic Acid	153	12,935	
			2.2		Nonflammable Gas	1013	Carbon dioxide, compressed	Carbon Dioxide	120	90	
6:30	East	Van	2.2	GA-SC	Nonflammable Gas	1018	Refrigerant gas R-22	Chlorodifluoromethane	126	1,570	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
			2.1		Flammable Gas	1950	Aerosol dispensers	Aerosols	126	105	
6:36	West	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	40,540	
6:36	East	MC338	2.2	GA-SC	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	40,000	
6:38	West	Van	8	SC-GA	Corrosive	1760	Corrosive liquid, NOS	Corrosive Liquid	154	10,740	
6:39	West	MC306	3	SC-GA	Flammable Liquid	1203	Gasoline	Gasohol	128	52,930	8717 gal
6:40	East	Van	8	GA-SC	Corrosive	1760	Corrosive liquid, NOS	Sodium Hydroxide	154	5,491	
6:45	West	MC307	6.1	NC-TX	Toxic Substance	3287	Toxic liquid, inorganic, NOS	Sodium Bichromate	151	33,220	
6:52	East	MC306	3	Unknown	Flammable Liquid	1203	Gasoline	Gasoline	128		Did not Stop
6:58	East	MC307	8	GA-SC	Corrosive	3264	Corrosive liquid, acidic, inorganic, NOS	Nitric/Sulfuric Acid	154	40,720	
6:59	East	MC331	2.2	LA-SC	Nonflammable Gas	1005	Ammonia, anhydrous, liquefied	Ammonia	125	18,430	
7:01	West	Van	2.1	NC-GA	Flammable Gas	1057	Lighters (cigarettes)(flammable gas)	Lighters	115	756	
7:03	West	Van	6.1	GA-GA	Toxic Substance	1897	Tetrachloroethylene	Tetrachloroethylene	160	743	
			6.1		Toxic Substance	1593	Dichloromethane	Methylene Chloride	160	1,115	
			3		Flammable Liquid	1193	Methyl ethyl ketone	Methyl Ethyl Ketone	127	1,216	
			3		Flammable Liquid	1263	Paint related material (flammable)	Paint	128	3,475	
			3		Flammable Liquid	1307	Xylenes	Xylene	130	5,587	
7:30	East	Van	8	Unknown	Corrosive	1791	Hypochlorite solution	Sodium Hypochlorite	154		Did not Stop
7:32	East	MC306	8	GA-GA	Corrosive	3266	Corrosive liquid, basic, inorganic, NOS	Potassium Hydroxide	153	15,436	
			3		Flammable Liquid	1993	Combustible liquid, NOS	Diethylhydroxylamine	132	2,794	
7:41	West	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	41,000	

Georgia Commodity Flow Survey
June 9-10, 2010
Survey Data Table

Time	Dir	Trailer Type	Trailer Placard	Orig/ Dest	Material Hazard Class	Mat'l ID	Material PSN	Material Name	ERG Guide No.	Quantity (lbs)	Other
8:14	West	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	40,000	
8:16	West	Van	8	GA-GA	Corrosive	2794	Batteries, wet, filled with acid	Batteries	154	2,000	
8:20	East	MC307	5.2	AL-NC	Organic Peroxide	3109	Organic peroxide, type F, liquid	Organic Peroxide	145	39,140	
8:27	West	Van	2.2	VA-GA	Nonflammable Gas	3159	Refrigerant gas R2134a	1,1,1,2-Tetrafluoroethane	126	42,000	
8:27	East	MC307	3	GA-NC	Flammable Liquid	1993	Combustible liquid, NOS	Combustible Liquid	128	0	Empty
8:29	West	MC312	8	NC-GA	Corrosive	2582	Ferric chloride, solution	Ferric Chloride	154	45,000	
8:30	East	MC331	2.2	Unknown	Nonflammable Gas	1005	Ammonia, anhydrous, liquefied	Ammonia	125	18,760	
8:33	West	MC331	2.2	GA-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	41,000	
8:35	East	ISO Box	4	GA-SC	Flammable Solids		Flammable solid, NOS	Flammable Solid	133		E mpty Drums
8:38	East	MC307	8	TX-VA	Corrosive	2218	Acrylic acid, stabilized	Acrylic Acid	132P	45,260	
8:40	East	MC307	2.2	TN-GA	Nonflammable Gas	2187	Carbon dioxide, refrigerated liquid	Carbon Dioxide	120	0	Empty
8:54	East	Van	8	LA-NC	Corrosive	1908	Sodium chlorite, solution, >5% available Chlorine	Sodium Chlorite	154	19,680	

Table 1
Truck Type, Shipments and
Total Cargo Weights

Truck Type	Truck Count	Shipments	Wt. (Lbs)
Van	97	149	927,266
MC307	60	62	1,741,375
MC306	39	43	978,708
MC312	33	34	979,762
MC331	28	28	534,926
MC338	24	24	574,085
Tube Trailer	19	19	171,620
Flat Bed	12	19	93,196
Dry Bulk	6	6	188,500
ISO Tank	6	6	124,994
ISO Box	4	5	43,280
30' Truck	3	5	4,130
FB w/Tank	2	2	1,400
Rolloff	1	1	28,755
Unknown	1	1	0
Total	**335**	**404**	**6,391,997**

Table 2
Placards for Hazardous Materials Classes/Divisions

Class **1** Explosives (49CFR173.50)

Class **2** Compressed Gasses (49CFR173.115)
- Division **2.1** Flammable Gas [49CFR173.115(a)]
- Division **2.2** Non-flammable, Non-Poisonous Gas [49CFR173.115(b)]
- Division **2.3** Poison Gas [49CFR173.115(b)]

Class **3** Flammable Liquids (49CFR173.120)

Class **4** Flammable Solids (49CFR173.124)
- Division **4.1** Flammable Solid [49CFR173.124(a)]
- Division **4.2** Spontaneously Combustible [49CFR 173.124(b)]
- Division **4.3** Dangerous When Wet [49CFR 173.124(c)]

Class **5** Oxidizers (49CFR173.127)
- Division **5.1** Oxidizers [49CFR173.127(a)]
- Division **5.2** Organic Peroxide [173.128(a)]

Class **6** Poisons (49CFR173.132)
- Division **6.1** Poisons [49CFR 173.132]

Class **7** Radioactive Materials (49CFR Subpart 1)

Class **8** Corrosive Liquids (49CFR173.136)

Class **9** Miscellaneous Hazardous Materials (49CFR 173.140)

DANGEROUS – 49CFR172.405(e)

Table 3
Alphabetic List of Observed Hazardous Materials

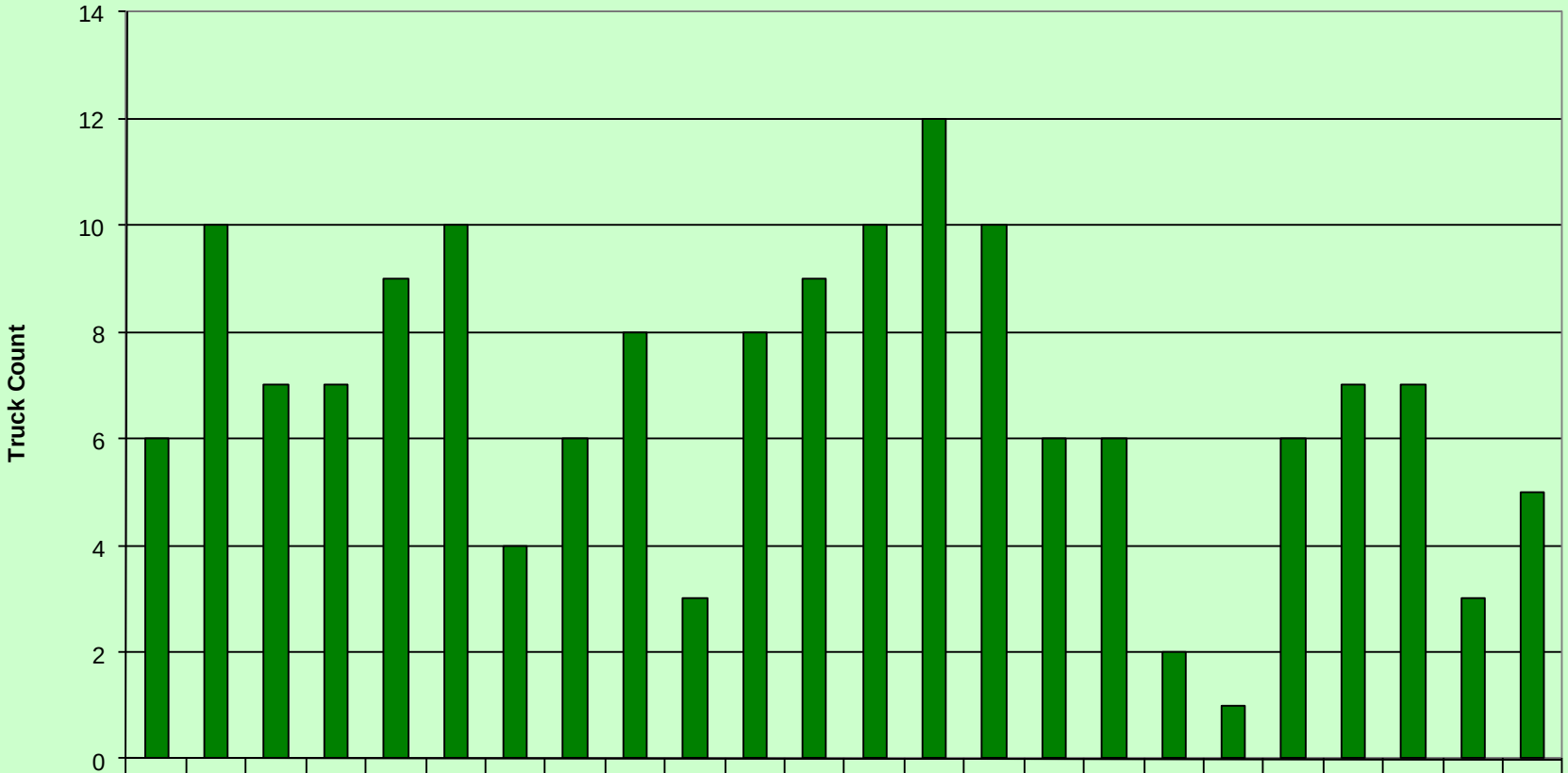
1.	1,1,1,2-Tetrafluoroethane
2.	1,2,4-Tricarboxylic Acid
3.	3-Methyl-3-Penten-2-one
4.	Acetic Acid
5.	Acrylamid / Formaldehyde
6.	Acrylic Acid
7.	Adhesives
8.	Aerosols
9.	Air, compressed
10	Alcohol
11.	Alkylbenzine Sulfonic Acid
12.	Allyl Chloride
13.	Ammonia
14.	Ammonium Hydrogen Difluoride
15.	Ammonium Hydroxide
16.	Ammonium Nitrate
17.	Ammunition
18.	Antimony Trioxide – Arsenic
19.	Antimony Wastes
20.	Argon
21.	Arsenic/Barium/Lead Waste
22.	Arsenic Acid
23.	Arsenic Acid / Chromic Acid
24.	Batteries
25.	Battery Fluid
26.	Bisphenol Epoxy Resin
27.	Benzyl Alcohol
28.	Butyl Alcohol
29.	Calcium Hypochlorite
30.	Captan
31.	Carbon Dioxide
32.	Carbon Monoxide
33.	Chlorine
34.	Chlorinating Tabs
35.	Chlorodifluoromethane
36.	Chromium Trioxide
37.	Citric Acid
38.	Cleaning Compound
39.	Combustible Liquid
40.	Corrosive Liquid
41.	Corrosive Solid
42.	Corrosive
43.	Cylosol Solvent
44.	Dangerous goods
45.	Diesel

46.	Diethylhydroxylamine
47.	Dimethylpropane
48.	Epoxy Resin
49.	Ethanol
50.	Ethanolamine
51.	Ethyl Acetate
52.	Ethylene Glycol
53.	Ethylene Oxide
54.	Explosives
55.	Extracts
56.	Ferric Chloride
57.	Fire Extinguishers
58.	Fireworks
59.	Flammable Solid
60.	Formaldehyde
61.	Fuel Oil
62.	Gasohol
63.	Gasoline
64.	Hazardous Waste
65.	Helium
66.	Heptane/Isopropanol
67.	Hexamethylenediamine
68.	Hydrochloric Acid
69.	Hydrofluoric Acid
70.	Hydrogen
71.	Isononylphenol-Ethoxylate
72.	Isopropanol
73.	Lighters
74.	LPG
75.	Liquefied Petroleum Gas
76.	Liquid Soap (acidic)
77.	Liquid Cleaner
78.	Mankozeb
78.	Metal Carbonyl
79.	Methyl Ethyl Ketone
80.	Methylene Chloride
81.	Mixed Phthalic Wastes
82.	Motor Fuel
83.	Motor Oil
84.	N-Butylaniline
85.	n-Propanol
86.	n-Propyl Acetate
87.	Naptha
88.	Neodymium Nitrate
89.	Nitric/Sulfuric Acid

90.	Nitrogen
91.	Nuclear Fuel Rods
92.	Octane
93.	Organic Peroxide
94.	Oxidizer (liquid)
95.	Oxygen
96.	Paint
97.	Paraquat
98.	Paranonyl Phenol
99.	Perfume
100.	Petroleum Naptha – Benzene
101.	Phosphonobutane Tricarboxylic Acid
102.	Phosphoric Acid
103.	Phosphorus Pentoxide
104.	Photo Acid
105.	Potassium Hydroxide
106.	Printing Ink
107.	Propane
108.	Propylene Oxide
109.	Pyrethrin
110.	Quinolene
111.	Radioactive Material
112.	Refrigerant Gas R404A
113.	Resins
114.	Road Tar

115.	Silicon Tetrafluoride
116.	Sodium Aluminate
117.	Sodium Bichromate
118.	Sodium Bisulfite
119.	Sodium Chlorate
120.	Sodium Chlorite
121.	Sodium Hydroxide
122.	Sodium Hydroxide Sulfide
123.	Sodium Hypochlorite
124.	Sodium Persulfate
125.	Sulfur Dioxide
126.	Sulfuric Acid
127.	Tall Oil Acids
128.	Tetrachloroethylene
129.	Tetrachloroethylene/Methylene Chloride
130.	Tetrapotassium Phosphate
131.	Trifluoroacetic Acid
132.	Tolcide MBT
133.	Toluene
134.	Waste flammable liquid
135.	Waste Petroleum Distillates
136.	Weapons Cartridges
137.	Wood Preservatives
138.	Xylene
139.	Xylene/Toluene

Chart 1 - Truck Count by Hour (Westbound)



	9th 09-10	9th 10-11	9th 11-12	9th 12-13	9th 13-14	9th 14-15	9th 15-16	9th 16-17	9th 17-18	9th 18-19	9th 19-20	9th 20-21	9th 21-22	9th 22-23	9th 23-24	10th 00-01	10th 01-02	10th 02-03	10th 03-04	10th 04-05	10th 05-06	10th 06-07	10th 07-08	10th 08-09
Total	6	10	7	7	9	10	4	6	8	3	8	9	10	12	10	6	6	2	1	6	7	7	3	5

Chart 2 - Truck Count by Hour (Eastbound)

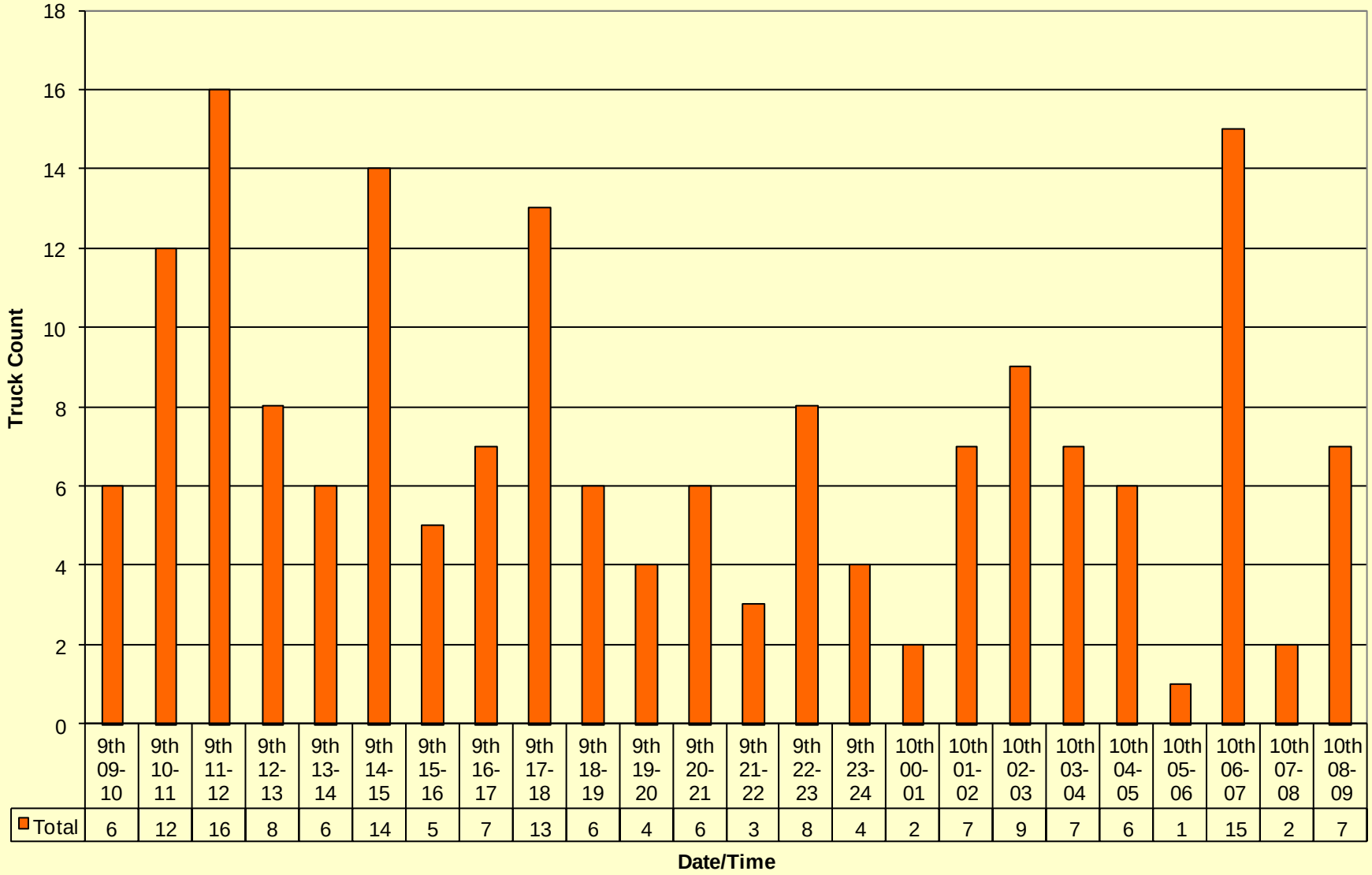
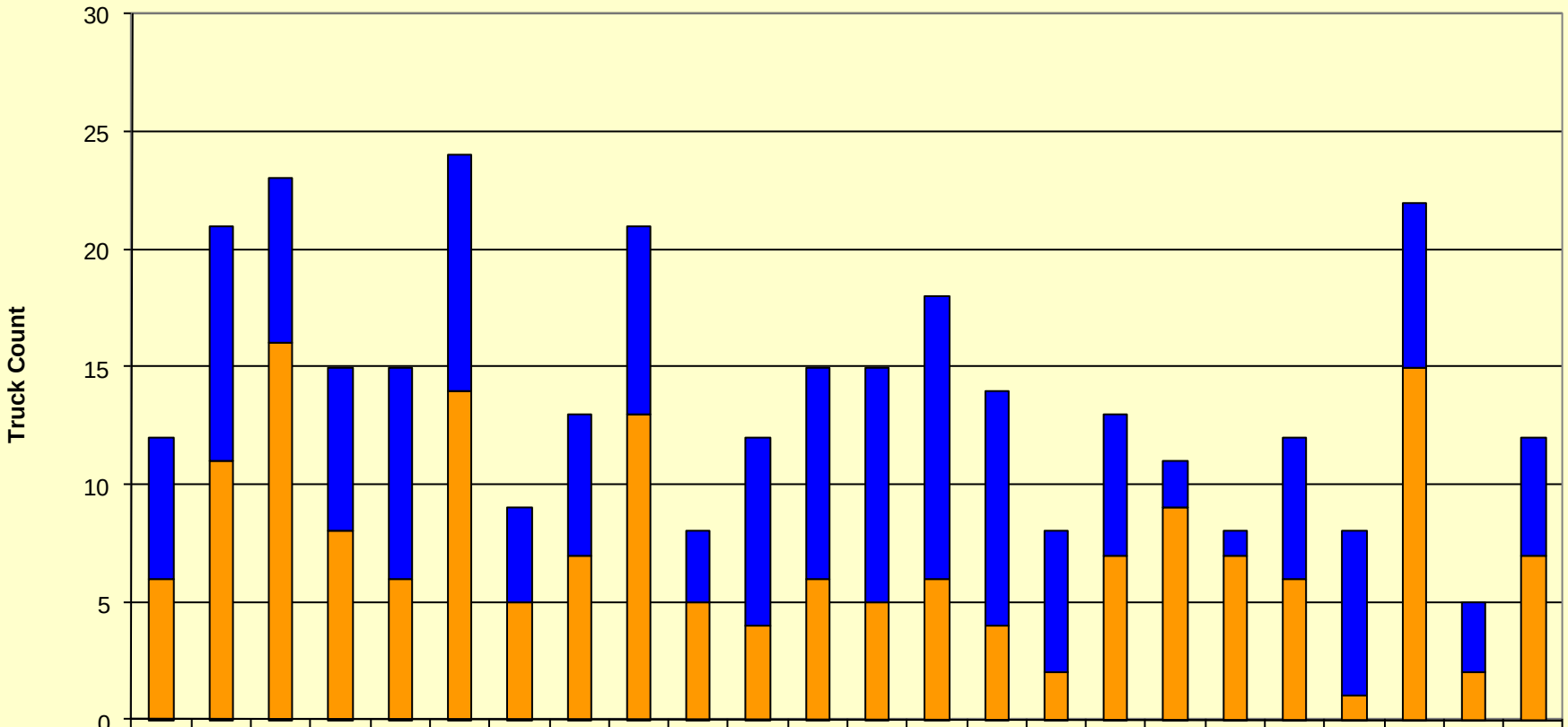


Chart 3 - Truck Count by Hour (Total)



	9th 09-10	9th 10-11	9th 11-12	9th 12-13	9th 13-14	9th 14-15	9th 15-16	9th 16-17	9th 17-18	9th 18-19	9th 19-20	9th 20-21	9th 21-22	9th 22-23	9th 23-24	10th 00-01	10th 01-02	10th 02-03	10th 03-04	10th 04-05	10th 05-06	10th 06-07	10th 07-08	10th 08-09
West	6	10	7	7	9	10	4	6	8	3	8	9	10	12	10	6	6	2	1	6	7	7	3	5
East	6	11	16	8	6	14	5	7	13	5	4	6	5	6	4	2	7	9	7	6	1	15	2	7

Date/Time

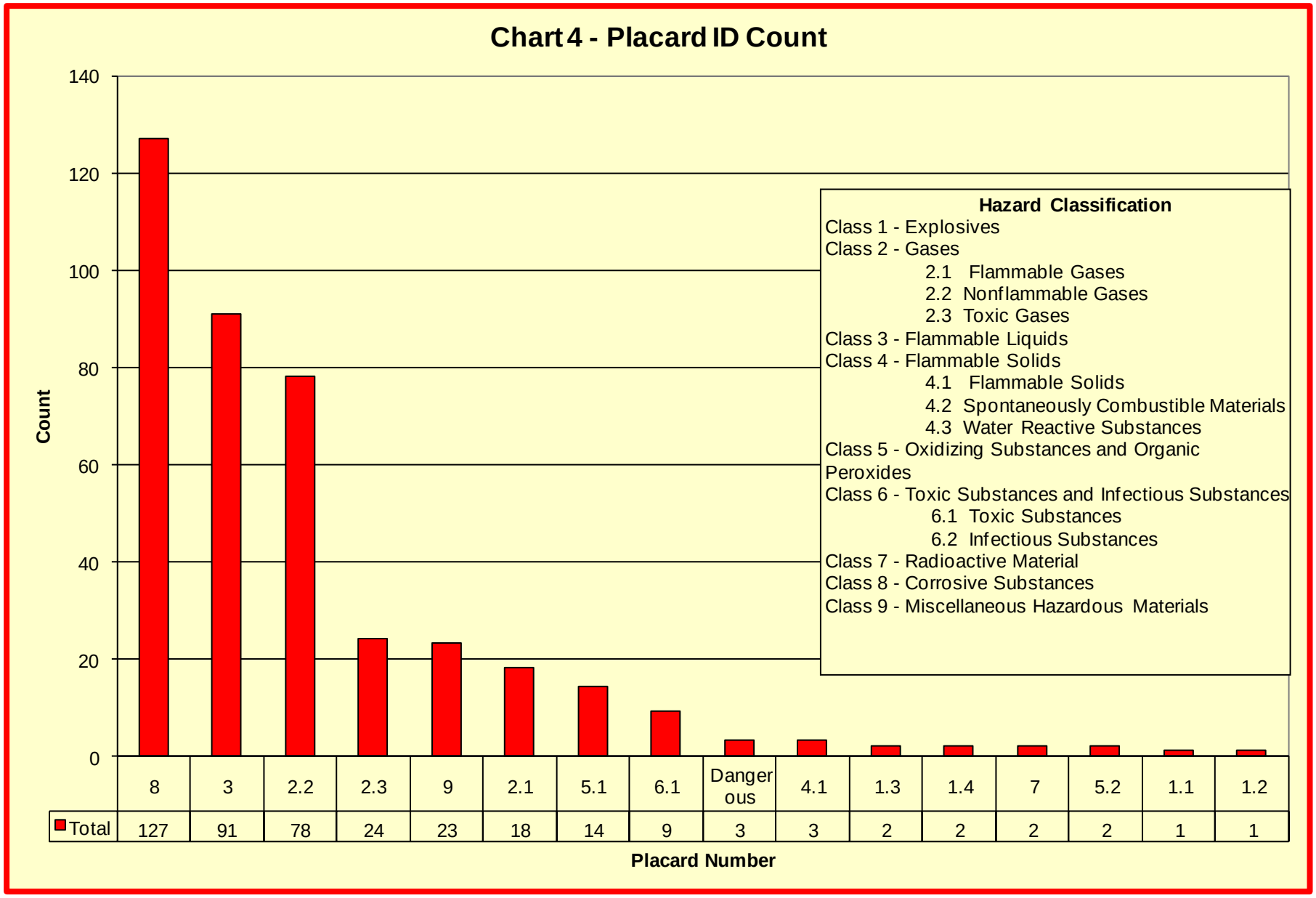
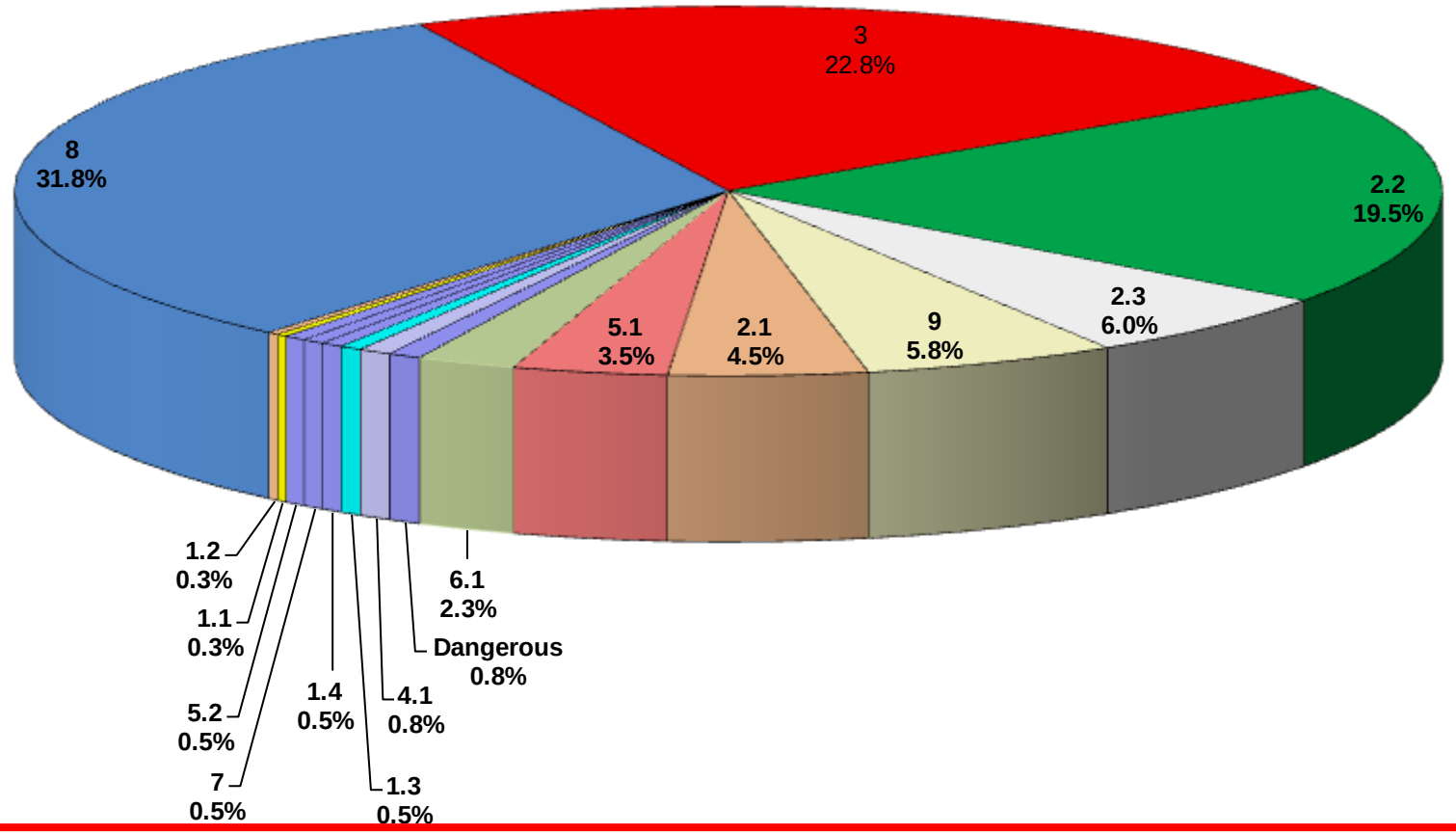


Chart 4 - Placard ID Count
Count
140
120
100
80
60
40
20
0
Hazard Classification
Class 1 - Explosives
Class 2 - Gases
2.1 Flammable Gases
2.2 Nonflammable Gases
2.3 Toxic Gases
Class 3 - Flammable Liquids
Class 4 - Flammable Solids
4.1 Flammable Solids
4.2 Spontaneously Combustible Materials
4.3 Water Reactive Substances
Class 5 - Oxidizing Substances and Organic Peroxides
Class 6 - Toxic Substances and Infectious Substances
6.1 Toxic Substances
6.2 Infectious Substances
Class 7 - Radioactive Material
Class 8 - Corrosive Substances
Class 9 - Miscellaneous Hazardous Materials
8 3 2.2 2.3 9 2.1 5.1 6.1 Dangerous 4.1 1.3 1.4 7 5.2 1.1 1.2
Total 127 91 78 24 23 18 14 9 3 3 2 2 2 2 1 1
Placard Number

Chart 5 - Distribution of Hazmat Placards



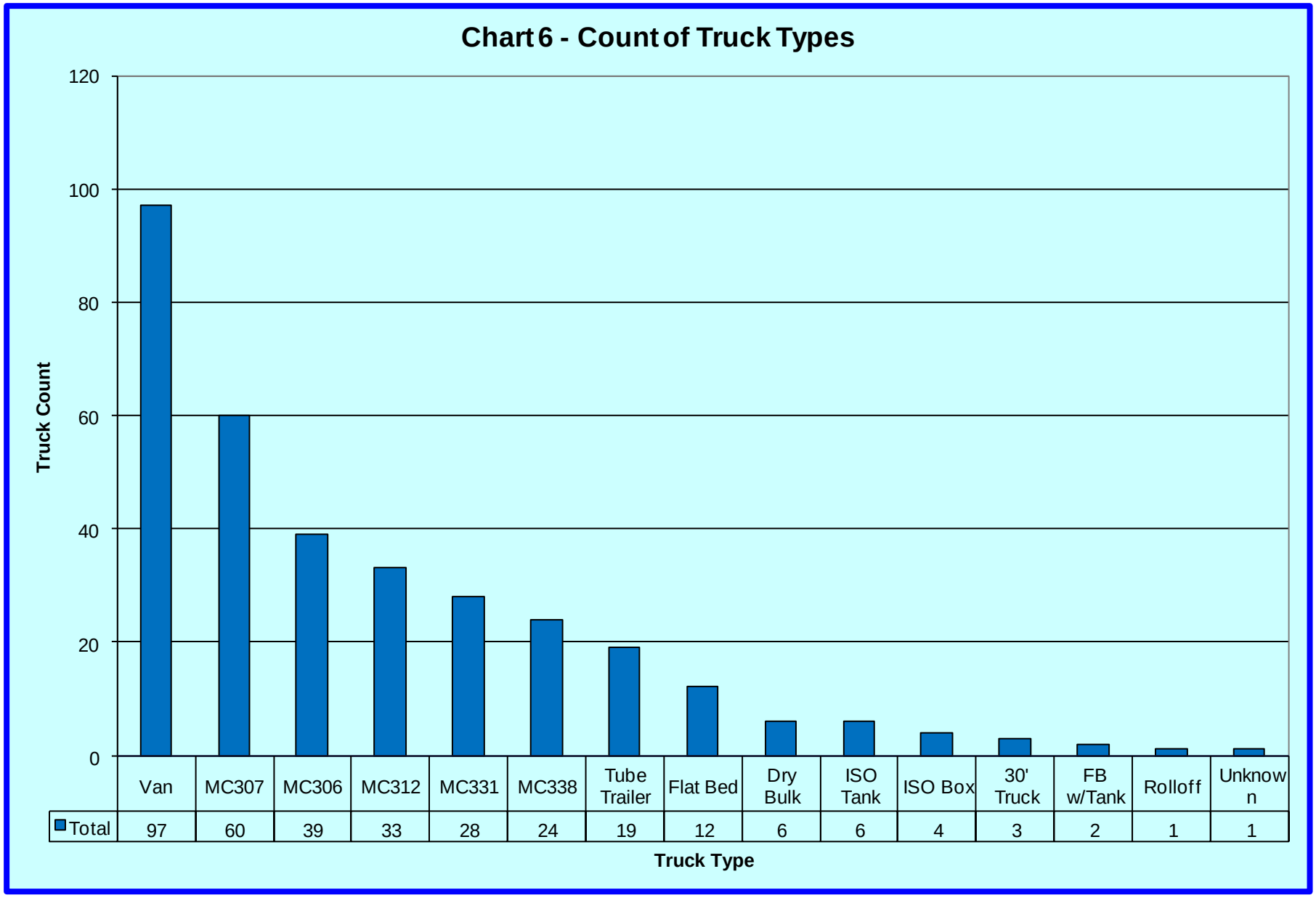


Chart 6 - Count of Truck Types
120
100
80
60
40
20
0
Truck Count
Van
MC307
MC306
MC312
MC331
MC338
Tube Trailer
Flat Bed
Dry Bulk
ISO Tank
ISO Box
30' Truck
FB w/Tank
Rolloff
Unknown
Total
97
60
39
33
28
24
19
12
6
6
4
3
2
1
1
Truck Type

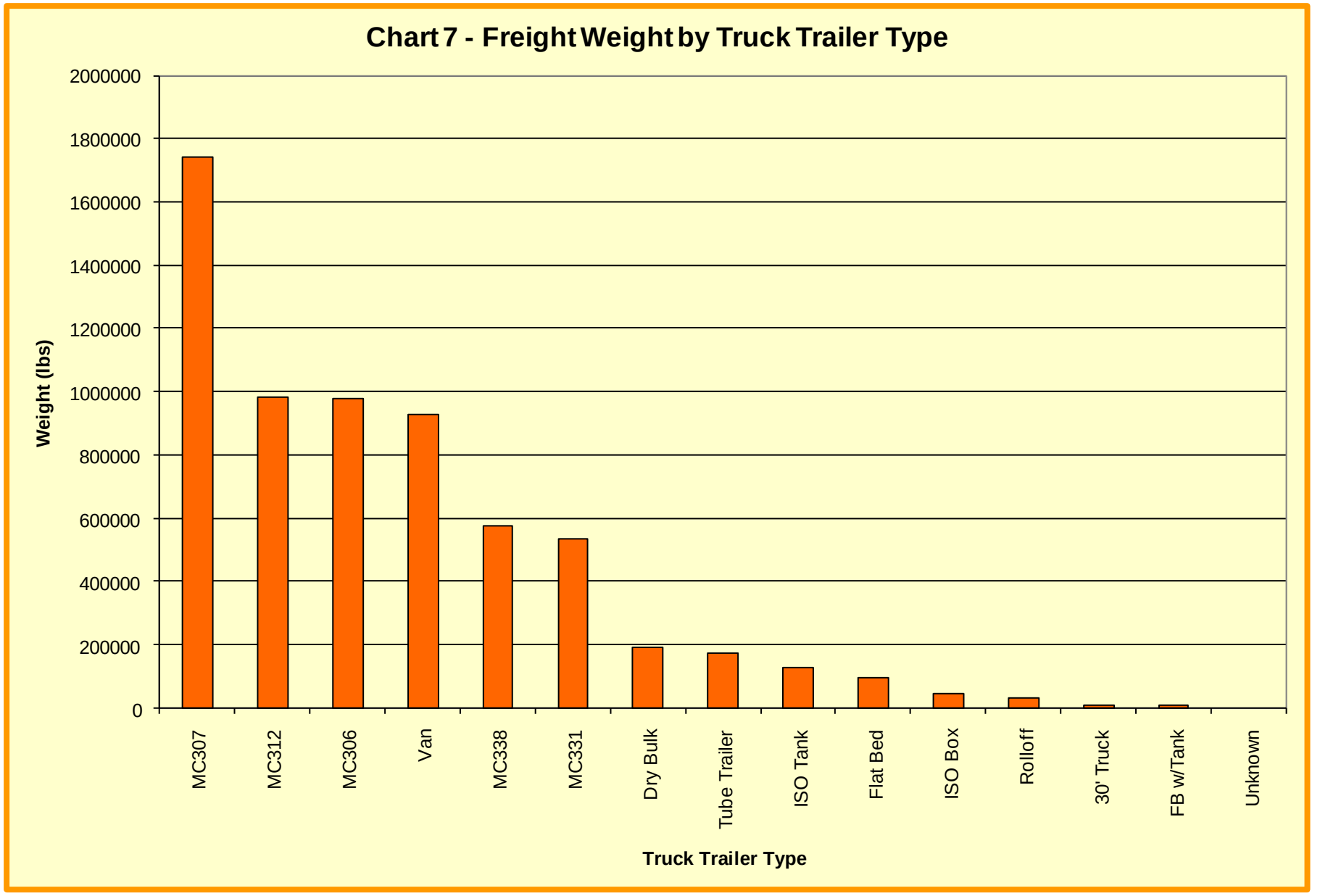


Chart 7 - Freight Weight by Truck Trailer Type
Weight (lbs)
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
MC307
MC312
MC306
Van
MC338
MC331
Dry Bulk
Tube Trailer
ISO Tank
Flat Bed
ISO Box
Rolloff
30' Truck
FB w/Tank
Unknown
Truck Trailer Type

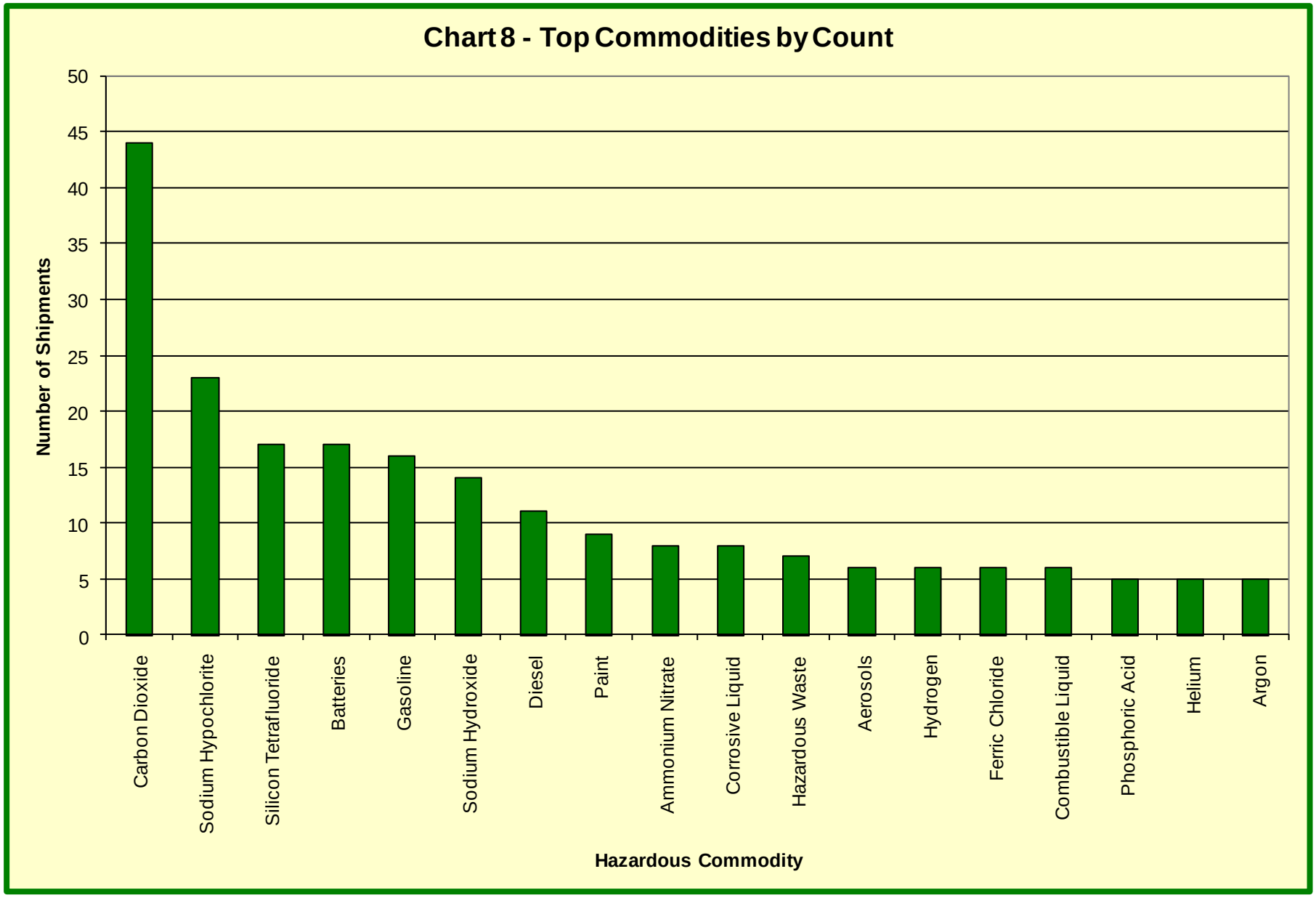


Chart 8 - Top Commodities by Count
Number of Shipments
50
45
40
35
30
25
20
15
10
5
0
Carbon Dioxide
Sodium Hypochlorite
Silicon Tetrafluoride
Batteries
Gasoline
Sodium Hydroxide
Diesel
Paint
Ammonium Nitrate
Corrosive Liquid
Hazardous Waste
Aerosols
Hydrogen
Ferric Chloride
Combustible Liquid
Phosphoric Acid
Helium
Argon
Hazardous Commodity

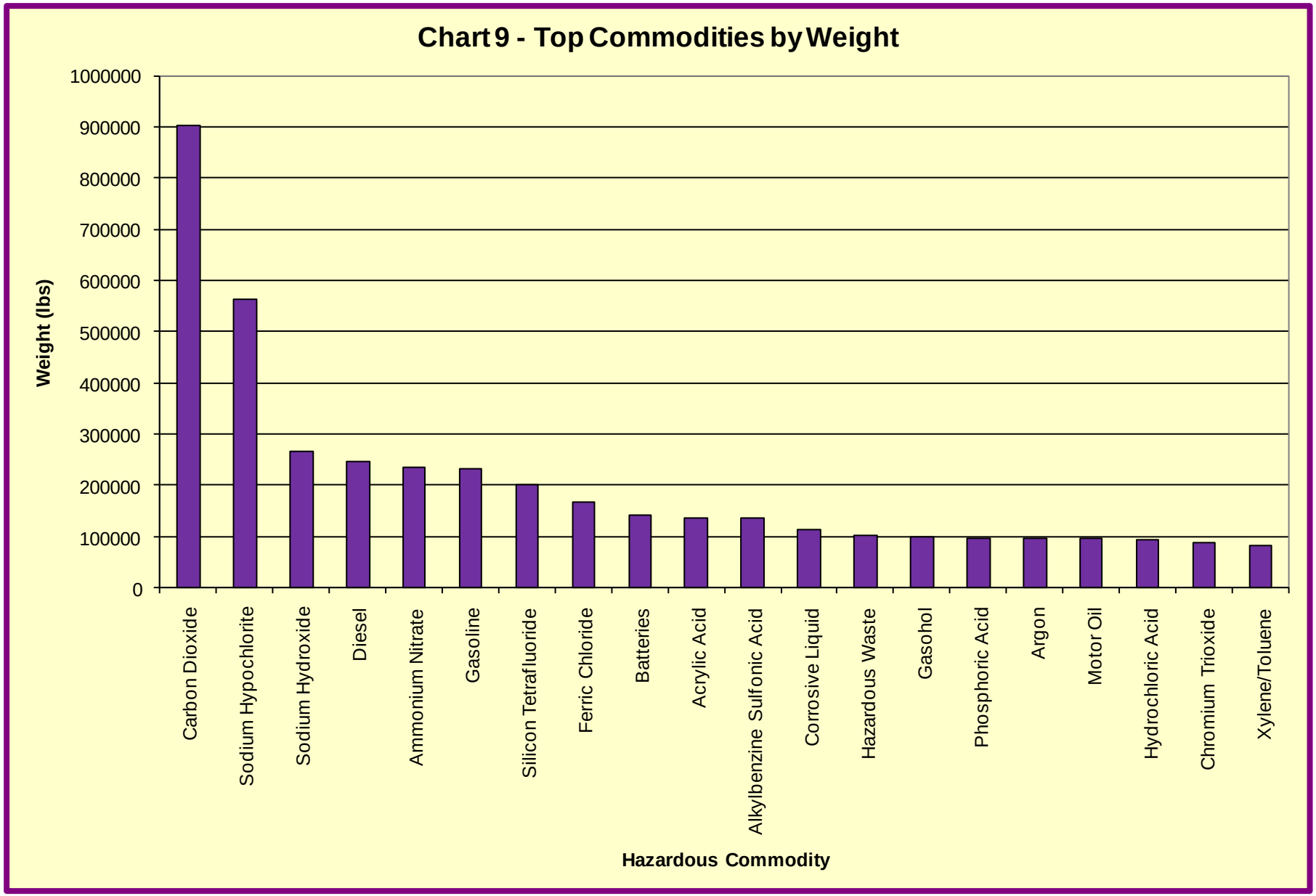


Chart 9 - Top Commodities by Weight
Weight (lbs)
1000000
900000
800000
700000
600000
500000
400000
300000
200000
100000
0
Carbon Dioxide
Sodium Hypochlorite
Sodium Hydroxide
Diesel
Ammonium Nitrate
Gasoline
Silicon Tetrafluoride
Ferric Chloride
Batteries
Acrylic Acid
Alkylbenzine Sulfonic Acid
Corrosive Liquid
Hazardous Waste
Gasohol
Phosphoric Acid
Argon
Motor Oil
Hydrochloric Acid
Chromium Trioxide
Xylene/Toluene
Hazardous Commodity

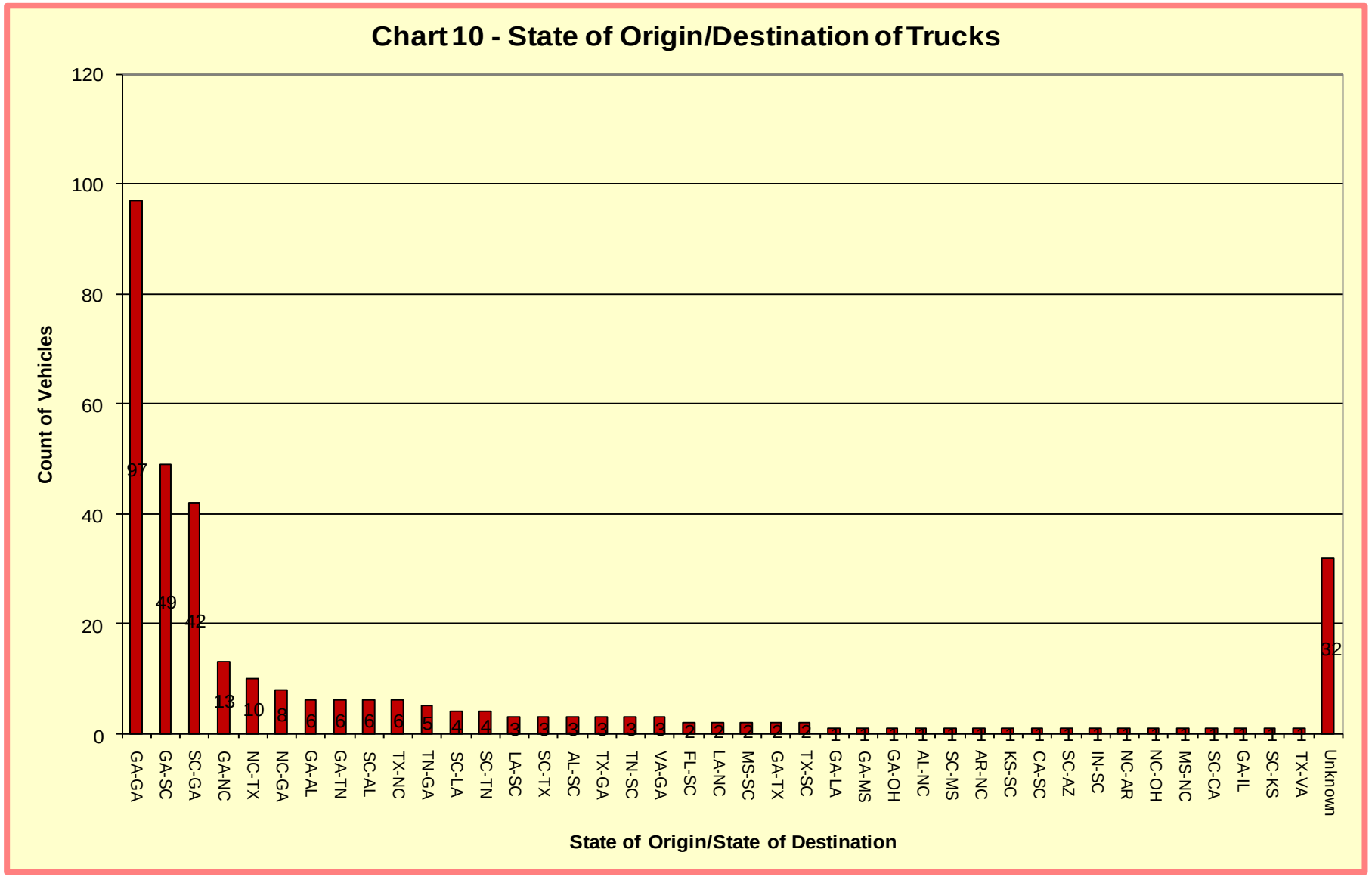


Chart 10 - State of Origin/Destination of Trucks
Count of Vehicles
120
100
80
60
40
20
0
97
49
42
13
10
8
6
6
6
6
5
4
4
3
3
3
3
3
3
2
2
2
2
2
1
1
1
1
1
1
1
1
1
1
1
1
1
1
32
GA-GA
GA-SC
SC-GA
GA-NC
NC-TX
NC-GA
GA-AL
GA-TN
SC-AL
TX-NC
TN-GA
SC-LA
SC-TN
LA-SC
SC-TX
AL-SC
TX-GA
TN-SC
VA-GA
FL-SC
LA-NC
MS-SC
GA-TX
TX-SC
GA-LA
GA-MS
GA-OH
AL-NC
SC-MS
AR-NC
KS-SC
CA-SC
SC-AZ
IN-SC
NC-AR
NC-OH
MS-NC
SC-CA
GA-IL
SC-KS
TX-VA
Unknown
State of Origin/State of Destination

Chart 11 - Transportation Patterns among States and Regions

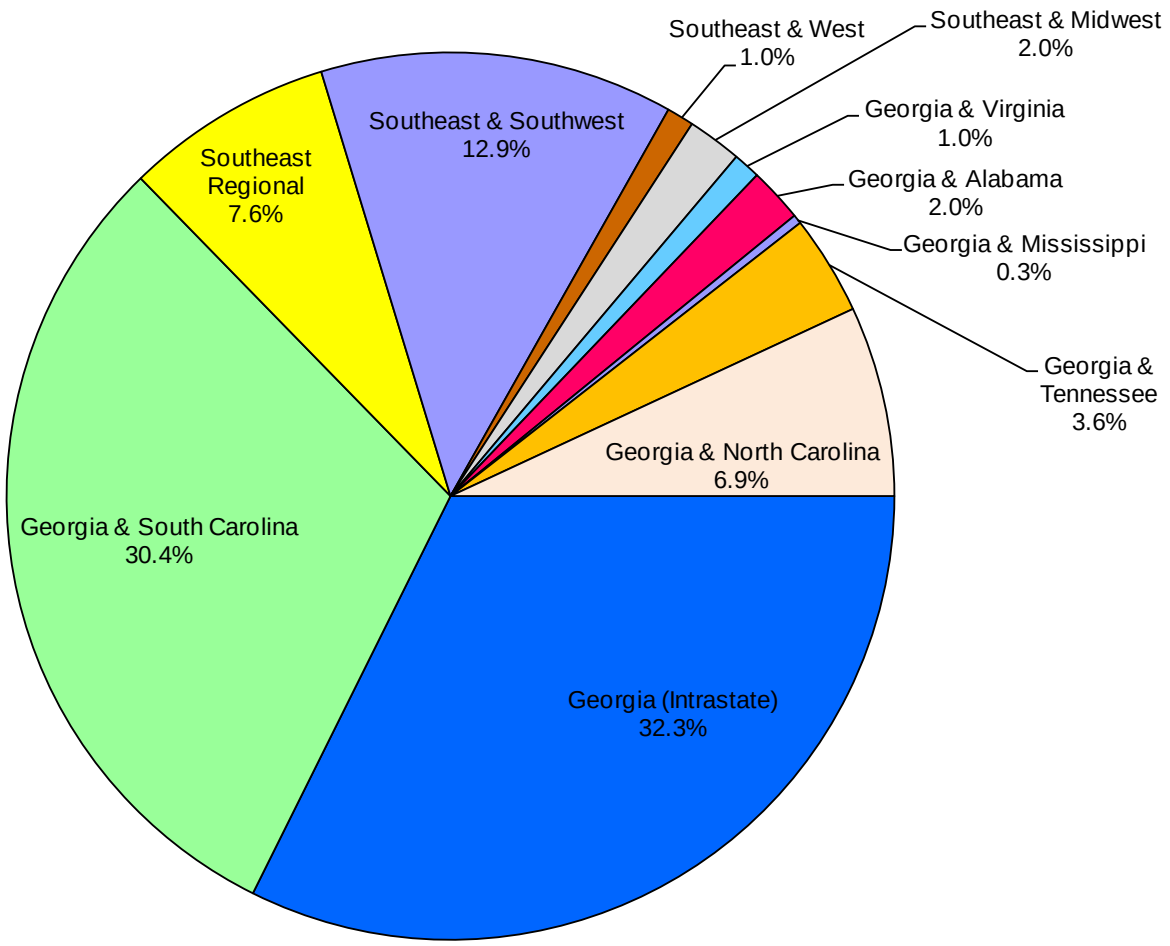
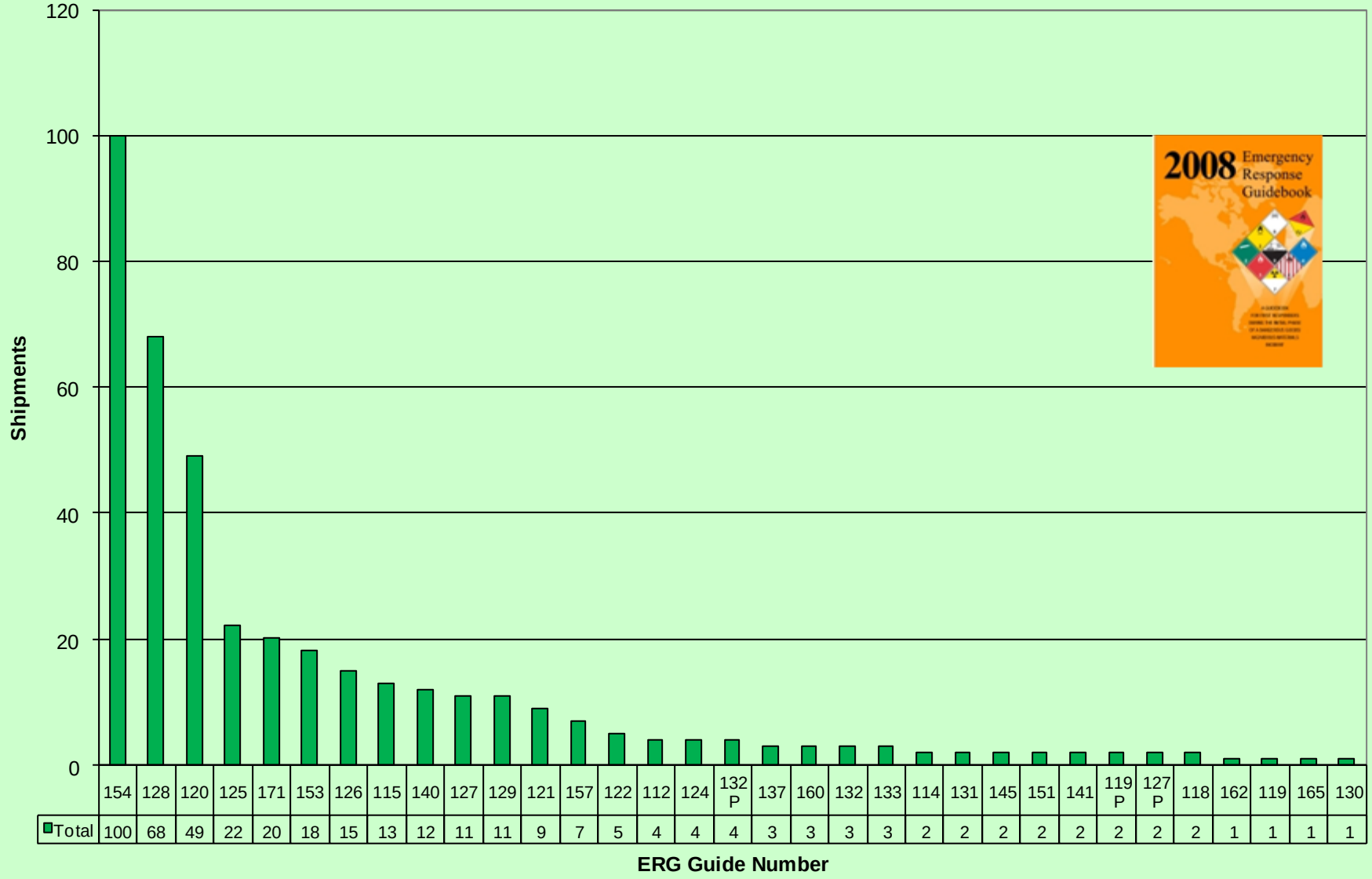


Chart 12 - Emergency Response Guidebook (ERG) Guide Numbers by Shipments



Conclusions/Findings/Observations

Traffic Flow – During the 24-hour commodity flow survey 6,112 commercial vehicles passed through the weigh stations. Of these, approximately 5.5% (336 vehicles) were carrying HAZMAT materials. The 336 HAZMAT vehicles were recorded as 174 eastbound vehicles and 162 westbound vehicles. Weight of HAZMAT materials logged during the survey was 6.392 million pounds. Of this total, 4.266 million pounds were westbound and 2.126 million pounds were eastbound, (see ***Table 1***).

The East to West HAZMAT vehicle ratio was about 1.07 to 1 (174/162) and indicates that, for this survey, the number of HAZMAT vehicles was nearly balanced with respect to direction of travel. However, the East to West ratio of commodity weights was about 0.498 to 1. This is unbalanced, and appears to be a result of a predominant westbound distribution pattern in bulk commodities.

From an examination of HAZMAT vehicle count by time of day (***Chart 1, Chart 2,*** and ***Chart 3***), there appear to be daily cycles in the pattern of flow. Westbound traffic flow generally increases beginning at about 7:00am, peaks between 10:00am and 3:00pm, rises to a daily peak at about 10:00pm, and diminishes to a daily low at about 4:00am, rises and remains fairly steady until about 7:00am. The pattern for eastbound traffic flow appears to increase from 7:00am until a daily peak is reached at about 12:00pm and thereafter decline, fairly steadily, until about 1:00am. From 1:00am to 6:00am there is a rise and fall of early morning traffic with unusually high morning traffic in the hour between 6:00am and 7:00am. Combined overall flow (East and West) averaged 14 commercial hazmat vehicles per hour over the 24-hour period of the survey. Starting a 7:00am the traffic built to above average flow by 10:00 am and remained above average until 3:00pm. Thereafter, there was a general decline in flow until about 6:00pm when the flow increased to a peak between10:00pm and 11:00pm and declined until 6:00am. Between 6:00am and 7:00am the flow was well above average at 22 vehicles per hour.

Table 2
Placards for Hazardous Materials Classes/Divisions

Class **1** Explosives (49CFR173.50)

Class **2** Compressed Gasses (49CFR173.115)
- Division **2.1** Flammable Gas [49CFR173.115(a)]
- Division **2.2** Non-flammable, Non-Poisonous Gas [49CFR173.115(b)]
- Division **2.3** Poison Gas [49CFR173.115(b)]

Class **3** Flammable Liquids (49CFR173.120)

Class **4** Flammable Solids (49CFR173.124)
- Division **4.1** Flammable Solid [49CFR173.124(a)]
- Division **4.2** Spontaneously Combustible [49CFR 173.124(b)]
- Division **4.3** Dangerous When Wet [49CFR 173.124(c)]

Class **5** Oxidizers (49CFR173.127)
- Division **5.1** Oxidizers [49CFR173.127(a)]
- Division **5.2** Organic Peroxide [173.128(a)]

Class **6** Poisons (49CFR173.132)
- Division **6.1** Poisons [49CFR 173.132]

Class **7** Radioactive Materials (49CFR Subpart 1)

Class **8** Corrosive Liquids (49CFR173.136)

Class **9** Miscellaneous Hazardous Materials (49CFR 173.140)

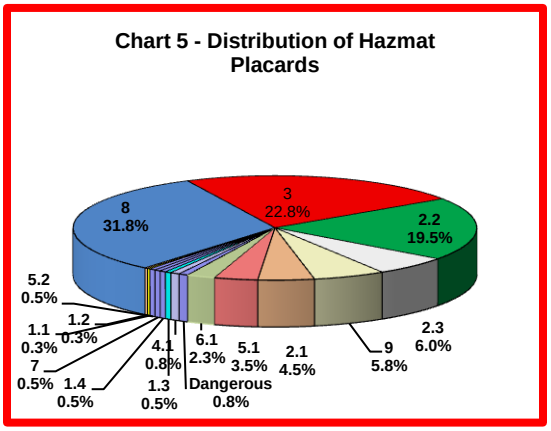
DANGEROUS – 49CFR172.405(e)

Placard Identification - During the flow survey, the placard numbers on each of the passing vehicles were recorded. ***Table 2*** provides a listing of Classes/Divisions of hazardous materials that require placards.

The use of hazardous materials placards is required by the Federal Motor Carrier Safety Regulations

when shipping hazardous materials and dangerous goods in the United States. The Hazardous Materials Regulations (49 CFR Parts 171-180) specify requirements for the safe transportation of hazardous materials, including the U.S. Department of Transportation requirements for the placarding of trucks and trailers. Reportable quantities of hazardous materials (except for radionuclides) are contained at 49CFR172.101 in Table 1 to Appendix A of the Hazardous Materials Table.

Chart 4 and *Chart 5* illustrate the numbers, classes and distribution of the placards observed during the survey. As can be seen from *Chart 5*, about 74% of the placards recorded during the survey were either Class 8 (Corrosive), Class 3 (Flammable Liquids) or Class 2.2 (Non-flammable, nonpoisonous gas) hazardous materials.



Keeping in mind the overall east/west traffic flow ratio of 1.07 to 1, the following E-W vehicle ratios hold for the other HAZMAT commodities: Class 1 = 4/2 = 2.00 to 1; Class 2 = 65/55= 1.18 to 1; Class 3 = 46/45 = 1.02 to 1, Class 4 = 2/1 = 2.00 to 1; Class 5 = 8/8 = 1.00 to 1; Class 6 = 4/5 = 0.80 to 1; Class 7 = 0/2 (all westbound); Class 8 = 71/56 =1.27 to 1; Class 9 = 9/14 = 0.64 to 1. This indicates predominant direction of flow for each of the nine hazard classes, e.g. Classes 1, 2, and 9 are appear to be mostly eastbound, whereas Classes 4, 5, 6, and 8 appear to be mostly westbound, given the data is limited.

It is noted that the direction of flow of vehicles carrying Class 3 and Class 5 materials appears to be balanced, whereas Classes 1, 2, 4, and 8 are predominantly eastbound and Classes 6, 7, and 9 are predominantly westbound.

Several vehicles were observed which displayed the DANGEROUS placard. A vehicle containing non-bulk packages with two or more categories of hazardous materials that require different placards may be displayed with a DANGEROUS placard, rather than separate placards, provided that there is less than 2205 pounds of one of the HAZMAT categories and that it was loaded on the vehicle at one loading facility [Reference: 49CFR172.405(e)].

Vehicle Loads – ***Table 1***, ***Chart 6*** and ***Chart 7*** show total counts and weights of materials by type of trailer. Vans (97) have the highest number of shipments (149), but bulk tank trailers (i.e. MC306, 307, 312, 331, 338 and tube trailers), account for the majority by weight, of all shipments. These 203 tankers, about 60% of all HAZMAT vehicles, represent about 80% of the total weight of shipments recorded. Also, an unusual number (19) of tube trailers was noted.

A pattern of fuel tankers, carrying gasoline and diesel, headed westbound throughout the day and returning empty eastbound was observed. This appears to indicate a pattern of regional distribution of petroleum products from west to east. Conversations with truckers indicated that many loads were originating near North Augusta.

It should also be noted that the quantity of diesel transported is slightly higher than the quantity of gasoline. It was suggested that this may be due agricultural demand in the area.

.

Variety of Commodities Observed – One hundred thirty nine different hazardous materials were recorded during the survey. An alphabetical list of these materials is presented in ***Table 3.***

Of these hazardous materials, ***Chart 8***, and **Chart 9** show the most frequent commodities recorded, by count of shipments and by total weight of shipments, respectively. These commodities account about half (213/404) of all shipments by count and almost two thirds (4.1M/6.4M) of all shipments by weight.

A comparison of these two charts clearly shows the effect of the many tanker shipments carrying large quantities of a single cargo. An average vanload of multiple hazmat commodities at 9,560 pounds, contrasts sharply with the 50,000 pound payload of a loaded commodity tank trailer. These factors result in different rankings for the same commodity in the two charts.

Hazmat Vehicle Origin/Destination Information

Information was collected on the point of origin and destination for 90% of the 336 hazmat vehicles observed. This information is helpful in determining the relationships among local, regional, and national traffic flow patterns and commodity flow trends at a particular survey point. ***Chart 10*** illustrates the frequency of traffic between pairs of states. At the survey point, approximately 71% (239/336) of the traffic was interstate and 29% (97/336) intrastate traffic. Of the interstate traffic, about 60% (143/239) either originated or terminated in Georgia.

Regional Shipment Origin/Destination Information

Information on regional origin/destination of the vehicles is developed in ***Chart 11*** which illustrates the known regional origin/destination of the HAZMAT shipments observed during the survey. The regional origin/destinations are ***Southeast*** (including GA, FL, SC, NC, VA, KY, TN, AL, MS, LA), ***Southwest*** (including TX, AR, LA),***West*** (including CA, AZ), and ***Midwest*** (including IL,IN, OH, KS)

Count of ERG Guide Numbers – The 2004 Emergency Response Guidebook (ERG), developed by the United States Department of Transportation, is a guide to first responders to aid them in quickly determining the hazards for dangerous goods involved in an incident and to respond accordingly to protect themselves, the public and the environment. These guides provide first responders with information on potential hazards, public safety actions and emergency response actions associated with a

particular hazardous material; e.g. if the material involved in the incident is propane, Guide #115 is applicable.

For each shipment identified during the survey, the ERG Guide Numbers associated with the hazardous materials in that particular shipment were noted. ***Chart 12*** shows the count of ERG Guide Numbers for each commodity logged during the survey and illustrates the frequency with which ERG responses occur. It addresses the probabilities of responders encountering certain commodities at this particular point and date on Interstate 20. This information provides insight on training needs for a certain response. This information may be useful in prioritizing specific training needed by first responders.

Observations

At the time of the survey, USDOT was also utilizing the state weigh stations as a part of a national exercise of random safety inspections on all commercial vehicles passing through these and other weigh stations and checkpoints. It is suspected that some local commercial traffic may have utilized parallel east-west routes (e.g., GA 223 and GA 232) to avoid being delayed at the weigh stations. This observation is based on the apparent absence of local home fuel delivery vehicles. However, it is believed in this instance that, the impact on the measurement of interstate vehicles was minimal.

Acknowledgement:

The DOE Office of Transportation wishes to express its appreciation for the excellent cooperation and valuable assistance of the organizations and people who made this report possible.

Georgia Emergency Management Agency
Randy Howard, WIPP/LEPC Coordinator

Georgia Department of Public Safety
Capt. Bruce Bugg

Columbia County Emergency & Operations Division
Pam Tucker, Director
Rusty Welsh, Deputy Director
Suzie Hughes, Administrative Specialist
Linda Fulmer, Operations Officer
Darlene Bartlett, Risk Manager

Community Emergency Response Team (CERT) Volunteers
Steve Aaronson
Eric Crawford
Gretchen Keneson
William Keneson
Caroline Guay
David Guay
Mario Banez
Miran Tyrrell
Virginia Berkhimer
Rip Jones
Earl Welsh
Lorraine Lynch
Kathy Riley
Chester Plecha
Jimmy Murray
David Brill
Ed Campbell
Alan McKenney

Martinez-Columbia Fire Rescue
Brent Willis
Patrick Dickson
Butch Murdock
David Bullard
Mike Greene
William Kovalchuck
David Moose
Dale Partlow
Travis Young

Fort Gordon Fire & Emergency Services
John Ryan

Henry County Fire Department
H.C. Sherwood
M. Roberts

Georgia Department of Natural Resources
Sean Hayes

Thanks again from the DOE Team:
Bill Spurgeon – DOE
Julia Donkin – DOE
Ella McNeil – DOE
Eric Huang – DOE
Larry Harmon – PEC
Larry Blalock – PEC

ERG Guide 112

EXPLOSIVES - DIVISION 1.1, 1.2, 1.3, 1.5 OR 1.6; CLASS A OR B

Appendix A

Emergency Response Information

Based on the commodity flow study, we are providing emergency response information for the hazard classes identified during the 24-hour period. Because we did not capture specific products in all cases, we are providing the general response information contained in the Department of Transportation Emergency Response Guidebook (ERG). An electronic copy of the ERG can be found at http://hazmat.dot.gov/pubs/erg/gydebook.htm.

Table of Contents

For those products where we captured significant numbers and quantities of material, we have included safety information. These products include:

POTENTIAL HAZARDS

ERG Guide 112

EXPLOSIVES - DIVISION 1.1, 1.2, 1.3, 1.5 OR 1.6; CLASS A OR B

FIRE OR EXPLOSION

- **MAY EXPLODE AND THROW FRAGMENTS 1600 meters (1 MILE) OR MORE IF FIRE REACHES CARGO.**
- **See below for information on "Compatibility Group" letters.**

HEALTH

- Fire may produce irritating, corrosive and/or toxic gases.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.

- Isolate spill or leak area immediately for at least 500 meters (1/3 mile) in all directions.
- Move people out of line of sight of the scene and away from windows.
- Keep unauthorized personnel away.
- Stay upwind.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- **Consider initial evacuation for 800 meters (1/2 mile) in all directions.**

Fire

- If rail car or trailer is involved in a fire and heavily encased explosives such as bombs or artillery projectiles are suspected, ISOLATE for 1600 m (1 mile) in all directions; also, initiate evacuation including emergency responders for 1600 m (1 mile) in all directions.
- When heavily encased explosives are not involved, evacuate the area for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

CARGO Fires

- **DO NOT fight fire when fire reaches cargo! Cargo may EXPLODE!**
- Stop all traffic and clear the area for at least 1600 meters (1 mile) in all directions and let burn.
- Do not move cargo or vehicle if cargo has been exposed to heat.

TIRE or VEHICLE Fires

- **Use plenty of water - FLOOD it! If water is not available, use CO2, dry chemical or dirt.**
- If possible, and WITHOUT RISK, use unmanned hose holders or monitor nozzles from maximum distance to prevent fire from spreading to cargo area.
- Pay special attention to tire fires as re-ignition may occur. Stand by with extinguisher ready.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- DO NOT OPERATE RADIO TRANSMITTERS WITHIN 100 meters (330 feet) OF ELECTRIC DETONATORS.
- **DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A**

SPECIALIST.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

COMPATABILITY GROUP

Letters identify explosives that are deemed to be compatible. Class 1 materials are considered to be “compatible” if they can be transported together without significantly increasing either the probability of an incident or, for a given quantity, the magnitude of the effects of such an incident.

A Substances which are expected to mass detonate very soon after fire reaches them.

B Articles which are expected to mass detonate very soon after fire reaches them.

C Substances or articles which may be readily ignited and burn violently without necessarily exploding.

D Substances or articles which may mass detonate (with blast and/or fragment hazard) when exposed to fire.

E&F Articles which may mass detonate in a fire.

G Substances and articles which may mass explode and give off smoke or toxic gases.

H Articles which in a fire may eject hazardous projectiles and dense white smoke.

J Articles which may mass explode.

K Articles which in a fire may eject hazardous projectiles and toxic gases.

L Substances and articles which present a special risk and could be activated by exposure to air or water.

N Articles which contain only extremely insensitive detonating substances and demonstrate a negligible probability of accidental ignition or propagation.

S Packaged substances or articles which, if accidentally initiated, produce effects that are usually confined to the immediate vicinity.

ERG Guide115

GASES – FLAMMABLE

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **EXTREMELY FLAMMABLE.**
- Will be easily ignited by heat, sparks or flames.
- Will form explosive mixtures with air.
- Vapors from liquefied gas are initially heavier than air and spread along ground.

CAUTION: Hydrogen (UN1049), Deuterium (UN1957) and Methane (UN1971) are lighter than air and will rise. Hydrogen and Deuterium fires are difficult to detect since they burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.)

- Vapors may travel to source of ignition and flash back.
- Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

HEALTH

- Vapors may cause dizziness or asphyxiation without warning.
- Some may be irritating if inhaled at high concentrations.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Fire may produce irritating and/or toxic gases.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Keep out of low areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.
- Always wear thermal protective clothing when handling refrigerated/cryogenic liquids.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 800 meters (1/2 mile).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.

ERG Guide115

GASES – FLAMMABLE

EMERGENCY RESPONSE

FIRE

• DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.CAUTION: Hydrogen (UN1049) and Deuterium (UN1957) burn with an invisible flame.

Small Fires

• Dry chemical or CO2.

Large Fires

• Water spray or fog.
• Move containers from fire area if you can do it without risk.

Fire involving Tanks

• Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
• Cool containers with flooding quantities of water until well after fire is out.
• Do not direct water at source of leak or safety devices; icing may occur.
• Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
• ALWAYS stay away from tanks engulfed in fire.
• For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

• ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
• All equipment used when handling the product must be grounded.
• Do not touch or walk through spilled material.
• Stop leak if you can do it without risk.
• If possible, turn leaking containers so that gas escapes rather than liquid.
• Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
• Do not direct water at spill or source of leak.
• Prevent spreading of vapors through sewers, ventilation systems and confined areas.
• Isolate area until gas has dispersed.

CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

FIRST AID

• Move victim to fresh air.
• Call 911 or emergency medical service.
• Give artificial respiration if victim is not breathing.
• Administer oxygen if breathing is difficult.
• Remove and isolate contaminated clothing and shoes.
• Clothing frozen to the skin should be thawed before being removed.
• In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
• In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
• Keep victim warm and quiet.
• Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide120

GASES - INERT
(INCLUDING REFRIGERATED LIQUIDS)

POTENTIAL HAZARDS

HEALTH
- Vapors may cause dizziness or asphyxiation without warning.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.

FIRE OR EXPLOSION
- **Non-flammable gases.**
- Containers may explode when heated.
- Ruptured cylinders may rocket.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.
- As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.
- Always wear thermal protective clothing when handling refrigerated/cryogenic liquids or solids.

EVACUATION

Large Spill
- Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire
- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE
- Use extinguishing agent suitable for type of surrounding fire.
- Move containers from fire area if you can do it without risk.
- Damaged cylinders should be handled only by specialists.

Fire involving Tanks
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Do not direct water at source of leak or safety devices; icing may occur.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.

- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Do not direct water at spill or source of leak.
- If possible, turn leaking containers so that gas escapes rather than liquid.
- Prevent entry into waterways, sewers, basements or confined areas.
- Allow substance to evaporate.
- Ventilate the area.

CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Clothing frozen to the skin should be thawed before being removed.
- In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 121

GASES - INERT

POTENTIAL HAZARDS

HEALTH

• Vapors may cause dizziness or asphyxiation without warning.
• Vapors from liquefied gas are initially heavier than air and spread along ground.

FIRE OR EXPLOSION

• **Non-flammable gases.**
• Containers may explode when heated.
• Ruptured cylinders may rocket.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed in Appendix B.

• As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
• Keep unauthorized personnel away.
• Stay upwind.
• Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
• Keep out of low areas.
• Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

• Wear positive pressure self-contained breathing apparatus (SCBA).
• Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

• Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

• If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

• Use extinguishing agent suitable for type of surrounding fire.
• Move containers from fire area if you can do it without risk.
• Damaged cylinders should be handled only by specialists.

Fire involving Tanks

• Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
• Cool containers with flooding quantities of water until well after fire is out.
• Do not direct water at source of leak or safety devices; icing may occur.
• Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
• ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

• Do not touch or walk through spilled material.
• Stop leak if you can do it without risk.
• Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to

contact spilled material.
• Do not direct water at spill or source of leak.

• If possible, turn leaking containers so that gas escapes rather than liquid.
• Prevent entry into waterways, sewers, basements or confined areas.
• Allow substance to evaporate.
• Ventilate the area.

FIRST AID

• Move victim to fresh air.
• Call 911 or emergency medical service.
• Give artificial respiration if victim is not breathing.
• Administer oxygen if breathing is difficult.
• Keep victim warm and quiet.
• Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 122

GASES - OXIDIZING

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- Substance does not burn but will support combustion.
- Some may react explosively with fuels.
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Runoff may create fire or explosion hazard.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

HEALTH

- Vapors may cause dizziness or asphyxiation without warning.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Fire may produce irritating and/or toxic gases.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed in Appendix B

- As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
- Always wear thermal protective clothing when handling refrigerated/cryogenic liquids.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 500 meters (1/3 mile).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

- Use extinguishing agent suitable for type of surrounding fire.

Small Fires

- Dry chemical or CO2.

Large Fires

- Water spray, fog or regular foam.

• Move containers from fire area if you can do it without risk.

• Damaged cylinders should be handled only by specialists.

Fire involving Tanks

• Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
• Cool containers with flooding quantities of water until well after fire is out.
• Do not direct water at source of leak or safety devices; icing may occur.
• Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
• ALWAYS stay away from tanks engulfed in fire.
• For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

• Keep combustibles (wood, paper, oil, etc.) away from spilled material.
• Do not touch or walk through spilled material.
• Stop leak if you can do it without risk.
• If possible, turn leaking containers so that gas escapes rather than liquid.
• Do not direct water at spill or source of leak.
• Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
• Prevent entry into waterways, sewers, basements or confined areas.
• Allow substance to evaporate.
• Isolate area until gas has dispersed.

CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

FIRST AID

• Move victim to fresh air.
• Call 911 or emergency medical service.
• Give artificial respiration if victim is not breathing.
• Administer oxygen if breathing is difficult.
• Remove and isolate contaminated clothing and shoes.
• Clothing frozen to the skin should be thawed before being removed.
• In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
• Keep victim warm and quiet.
• Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 126

GASES - COMPRESSED OR LIQUEFIED

(INCLUDING REFRIGERANT GASES)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- Some may burn, but none ignite readily.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

HEALTH

- Vapors may cause dizziness or asphyxiation without warning.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Fire may produce irritating, corrosive and/or toxic gases.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Apendix B.

- As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 500 meters (1/3 mile).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

- Use extinguishing agent suitable for type of surrounding fire.

Small Fires

- Dry chemical or CO2.

Large Fires

- Water spray, fog or regular foam.
- Move containers from fire area if you can do it without risk.
- Damaged cylinders should be handled only by specialists.

Fire involving Tanks

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

ERG Guide 126

GASES - COMPRESSED OR LIQUEFIED

(INCLUDING REFRIGERANT GASES)

- Cool containers with flooding quantities of water until well after fire is out.
- Do not direct water at source of leak or safety devices; icing may occur.

- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- Some of these materials, if spilled, may evaporate leaving a flammable residue.

SPILL OR LEAK

- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Do not direct water at spill or source of leak.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- If possible, turn leaking containers so that gas escapes rather than liquid.
- Prevent entry into waterways, sewers, basements or confined areas.
- Allow substance to evaporate.
- Ventilate the area.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 127

FLAMMABLE LIQUIDS
(POLAR/WATER-MISCIBLE)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **"P"** in the Emergency Response Guidebook may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control may cause pollution.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fires

- Dry chemical, CO2, water spray or alcohol-resistant foam.

Large Fires

- Water spray, fog or alcohol-resistant foam.

- Use water spray or fog; do not use straight streams.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spills

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 128

FLAMMABLE LIQUIDS
(NON-POLAR/WATER-IMMISCIBLE)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **"P"** in the Emergency Response Guidebook may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.
- Substance may be transported hot.
- **If molten aluminum is involved, refer to ERG GUIDE 169.**

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

ERG Guide 128

FLAMMABLE LIQUIDS
(NON-POLAR/WATER-IMMISCIBLE)

CAUTION: For mixtures containing a high percentage of an alcohol or polar solvent, alcohol-resistant foam may be more effective.

Small Fires

• Dry chemical, CO2, water spray or regular foam.

Large Fires

• Water spray, fog or regular foam.
• Use water spray or fog; do not use straight streams.
• Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

• Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
• Cool containers with flooding quantities of water until well after fire is out.
• Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
• ALWAYS stay away from tanks engulfed in fire.
• For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

• ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
• All equipment used when handling the product must be grounded.
• Do not touch or walk through spilled material.
• Stop leak if you can do it without risk.
• Prevent entry into waterways, sewers, basements or confined areas.
• A vapor suppressing foam may be used to reduce vapors.
• Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
• Use clean non-sparking tools to collect absorbed material.

Large Spills

• Dike far ahead of liquid spill for later disposal.
• Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

• Move victim to fresh air.
• Call 911 or emergency medical service.
• Give artificial respiration if victim is not breathing.
• Administer oxygen if breathing is difficult.
• Remove and isolate contaminated clothing and shoes.
• In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
• Wash skin with soap and water.
• Keep victim warm and quiet.
• In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
• Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 129

FLAMMABLE LIQUIDS
(POLAR/WATER-MISCIBLE/NOXIOUS)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **"P"** in the Emergency Response Guidebook may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- May cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fires

- Dry chemical, CO2, water spray or alcohol-resistant foam.

ERG Guide 129

FLAMMABLE LIQUIDS
(POLAR/WATER-MISCIBLE/NOXIOUS)

- **Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane.**

Large Fires
- Water spray, fog or alcohol-resistant foam.
- **Do not use straight streams.**
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spills
- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID
- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- Keep victim warm and quiet.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 131

FLAMMABLE LIQUIDS – TOXIC

POTENTIAL HAZARDS

HEALTH

- **TOXIC; may be fatal if inhaled, ingested or absorbed through skin.**
- Inhalation or contact with some of these materials will irritate or burn skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion and poison hazard indoors, outdoors or in sewers.
- Those substances designated with a **"P"** in the Emergency Response Guidebook may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind. • Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY".

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

ERG Guide 131

FLAMMABLE LIQUIDS – TOXIC

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fires

• Dry chemical, CO2, water spray or alcohol-resistant foam.

Large Fires

• Water spray, fog or alcohol-resistant foam.
• Move containers from fire area if you can do it without risk.
• Dike fire control water for later disposal; do not scatter the material.
• Use water spray or fog; do not use straight streams.

Fire involving Tanks or Car/Trailer Loads

• Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
• Cool containers with flooding quantities of water until well after fire is out.
• Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
• ALWAYS stay away from tanks engulfed in fire.
• For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

• Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.
• ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
• All equipment used when handling the product must be grounded.
• Do not touch or walk through spilled material.
• Stop leak if you can do it without risk.
• Prevent entry into waterways, sewers, basements or confined areas.
• A vapor suppressing foam may be used to reduce vapors.

Small Spills

• Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal.
• Use clean non-sparking tools to collect absorbed material.

Large Spills • Dike far ahead of liquid spill for later disposal.
• Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

• Move victim to fresh air.
• Call 911 or emergency medical service.
• Give artificial respiration if victim is not breathing.
• **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
• Administer oxygen if breathing is difficult.
• Remove and isolate contaminated clothing and shoes.
• In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
• Wash skin with soap and water. • Keep victim warm and quiet.
• In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
• Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
• Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide132

FLAMMABLE LIQUIDS - CORROSIVE

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **Flammable/combustible materials.**
- May be ignited by heat, sparks or flames.
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **"P"** in the Emergency Response Guidebook may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- May cause toxic effects if inhaled or ingested/swallowed.
- Contact with substance may cause severe burns to skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Large Spill

- See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under “PUBLIC SAFETY”.

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

ERG Guide132

FLAMMABLE LIQUIDS - CORROSIVE

EMERGENCY RESPONSE

FIRE

• Some of these materials may react violently with water.

Small Fires

• Dry chemical, CO2, water spray or alcohol-resistant foam.

Large Fires

• Water spray, fog or alcohol-resistant foam.
• Move containers from fire area if you can do it without risk.
• Dike fire control water for later disposal; do not scatter the material.
• Do not get water inside containers.

Fire involving Tanks or Car/Trailer Loads

• Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
• Cool containers with flooding quantities of water until well after fire is out.
• Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
• ALWAYS stay away from tanks engulfed in fire.
• For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

• Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.
• ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
• All equipment used when handling the product must be grounded.
• Do not touch or walk through spilled material.
• Stop leak if you can do it without risk.
• Prevent entry into waterways, sewers, basements or confined areas.
• A vapor suppressing foam may be used to reduce vapors.
• Absorb with earth, sand or other non-combustible material and transfer to containers (except for Hydrazine).
• Use clean non-sparking tools to collect absorbed material.

Large Spills

• Dike far ahead of liquid spill for later disposal.
• Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

• Move victim to fresh air.
• Call 911 or emergency medical service.
• Give artificial respiration if victim is not breathing.
• **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
• Administer oxygen if breathing is difficult.
• Remove and isolate contaminated clothing and shoes.
• In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
• In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
• Keep victim warm and quiet.
• Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
• Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide133

FLAMMABLE SOLIDS

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- Flammable/combustible material.
- May be ignited by friction, heat, sparks or flames.
- Some may burn rapidly with flare burning effect.
- Powders, dusts, shavings, borings, turnings or cuttings may explode or burn with explosive violence.
- Substance may be transported in a molten form at a temperature that may be above its flash point.
- May re-ignite after fire is extinguished.

HEALTH

- Fire may produce irritating and/or toxic gases.
- Contact may cause burns to skin and eyes.
- Contact with molten substance may cause severe burns to skin and eyes.
- Runoff from fire control may cause pollution.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

Small Fires

- Dry chemical, CO2, sand, earth, water spray or regular foam.

Large Fires

- Water spray, fog or regular foam.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Cool containers with flooding quantities of water until well after fire is out.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of

tank.
• ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK
• ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
• Do not touch or walk through spilled material.

Small Dry Spills
• With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

Large Spills
• Wet down with water and dike for later disposal.
• Prevent entry into waterways, sewers, basements or confined areas.

FIRST AID
• Move victim to fresh air.
• Call 911 or emergency medical service.
• Give artificial respiration if victim is not breathing.
• Administer oxygen if breathing is difficult.
• Remove and isolate contaminated clothing and shoes.
• In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
• Removal of solidified molten material from skin requires medical assistance.
• Keep victim warm and quiet.
• Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 137

SUBSTANCES - WATER-REACTIVE - CORROSIVE

POTENTIAL HAZARDS

HEALTH

- CORROSIVE and/or TOXIC; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.
- Fire will produce irritating, corrosive and/or toxic gases.
- Reaction with water may generate much heat which will increase the concentration of fumes in the air.
- Contact with molten substance may cause severe burns to skin and eyes.
- Runoff from fire control or dilution water may cause pollution.

FIRE OR EXPLOSION

- EXCEPT FOR ACETIC ANHYDRIDE (UN1715), THAT IS FLAMMABLE, some of these materials may burn, but none ignite readily.
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Substance will react with water (some violently), releasing corrosive and/or toxic gases.
- Flammable/toxic gases may accumulate in confined areas (basement, tanks, hopper/tank cars etc.)
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated or if contaminated with water.
- Substance may be transported in a molten form.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See the Table of Initial Isolation and Protective Action Distances in the Emergency Response Guidebook for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under “PUBLIC SAFETY”.

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

ERG Guide 137

SUBSTANCES - WATER-REACTIVE - CORROSIVE

EMERGENCY RESPONSE

FIRE

- **When material is not involved in fire: do not use water on material itself.**

Small Fires

- Dry chemical or CO2.
- Move containers from fire area if you can do it without risk.

Large Fires

- Flood fire area with large quantities of water, while knocking down vapors with water fog. If insufficient water supply: knock down vapors only.

Fire involving Tanks or Car/Trailer Loads

- Cool containers with flooding quantities of water until well after fire is out.
- Do not get water inside containers.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
- Keep combustibles (wood, paper, oil, etc.) away from spilled material.

Small Spills

- Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.
- Use clean non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.
- Prevent entry into waterways, sewers, basements or confined areas.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Removal of solidified molten material from skin requires medical assistance.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 140

OXIDIZERS

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- These substances will accelerate burning when involved in a fire.
- Some may decompose explosively when heated or involved in a fire.
- May explode from heat or contamination.
- Some will react explosively with hydrocarbons (fuels).
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Containers may explode when heated.
- Runoff may create fire or explosion hazard.

HEALTH

- Inhalation, ingestion or contact (skin, eyes) with vapors or substance may cause severe injury, burns or death.
- Fire may produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

Small Fires

- Use water. Do not use dry chemicals or foams. CO2 or Halon® may provide limited control.

Large Fires

- Flood fire area with water from a distance.
- Move containers from fire area if you can do it without risk.
- Do not move cargo or vehicle if cargo has been exposed to heat.
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.

ERG Guide 140

OXIDIZERS

• ALWAYS stay away from tanks engulfed in fire.

• For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

• Keep combustibles (wood, paper, oil, etc.) away from spilled material.
• Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
• Stop leak if you can do it without risk.
• Do not get water inside containers.

Small Dry Spills

• With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

Small Liquid Spills

• Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.

Large Spills

• Dike far ahead of liquid spill for later disposal.
• **Following product recovery, flush area with water.**

FIRST AID

• Move victim to fresh air.
• Call 911 or emergency medical service.
• Give artificial respiration if victim is not breathing.
• Administer oxygen if breathing is difficult.
• Remove and isolate contaminated clothing and shoes.
• Contaminated clothing may be a fire risk when dry.
• In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
• Keep victim warm and quiet.
• Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 153

SUBSTANCES - TOXIC AND/OR CORROSIVE (COMBUSTIBLE)

POTENTIAL HAZARDS

HEALTH

- **TOXIC**; inhalation, ingestion or skin contact with material may cause severe injury or death.
- Contact with molten substance may cause severe burns to skin and eyes.
- Avoid any skin contact.
- Effects of contact or inhalation may be delayed.
- Fire may produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

FIRE OR EXPLOSION

- Combustible material: may burn but does not ignite readily.
- When heated, vapors may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards.
- Those substances designated with a **"P"** in the Emergency Response Guidebook may polymerize explosively when heated or involved in a fire.
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated.
- Runoff may pollute waterways.
- Substance may be transported in a molten form.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See the Table of Initial Isolation and Protective Action Distances in the Emergency Response Guidebook for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under “PUBLIC SAFETY”.

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

ERG Guide 153

SUBSTANCES - TOXIC AND/OR CORROSIVE (COMBUSTIBLE)

FIRE

Small Fires

- Dry chemical, CO2 or water spray.

Large Fires

- Dry chemical, CO2, alcohol-resistant foam or water spray.
- Move containers from fire area if you can do it without risk.
- Dike fire control water for later disposal; do not scatter the material.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- DO NOT GET WATER INSIDE CONTAINERS.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 154

SUBSTANCES - TOXIC AND/OR CORROSIVE (NON-COMBUSTIBLE)

POTENTIAL HAZARDS

HEALTH

- **TOXIC**; inhalation, ingestion or skin contact with material may cause severe injury or death.
- Contact with molten substance may cause severe burns to skin and eyes.
- Avoid any skin contact.
- Effects of contact or inhalation may be delayed.
- Fire may produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

FIRE OR EXPLOSION

- Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
- Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.).
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See the Table of Initial Isolation and Protective Action Distances (green pages in the 2004 Emergency Response Guidebook) for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under “PUBLIC SAFETY”.

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

ERG Guide 154

SUBSTANCES - TOXIC AND/OR CORROSIVE (NON-COMBUSTIBLE)

FIRE

Small Fires

- Dry chemical, CO2 or water spray.

Large Fires

- Dry chemical, CO2, alcohol-resistant foam or water spray.
- Move containers from fire area if you can do it without risk.
- Dike fire control water for later disposal; do not scatter the material.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- DO NOT GET WATER INSIDE CONTAINERS.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG GUIDE 157

SUBSTANCES - TOXIC AND/OR CORROSIVE
(NON-COMBUSTIBLE/WATER-SENSITIVE)

POTENTIAL HAZARDS

HEALTH

- **TOXIC**; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.
- Reaction with water or moist air will release toxic, corrosive or flammable gases.
- Reaction with water may generate much heat that will increase the concentration of fumes in the air.
- Fire will produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

FIRE OR EXPLOSION

- Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.).
- Substance will react with water (some violently), releasing corrosive and/or toxic gases.
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated or if contaminated with water.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under “PUBLIC SAFETY”.

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

- Note: Most foams will react with the material and release corrosive/toxic gases.

ERG GUIDE 157

SUBSTANCES - TOXIC AND/OR CORROSIVE
(NON-COMBUSTIBLE/WATER-SENSITIVE)

Small Fires

• CO2 (except for Cyanides), dry chemical, dry sand, alcohol-resistant foam.

Large Fires

• Water spray, fog or alcohol-resistant foam.
• Move containers from fire area if you can do it without risk.
• Use water spray or fog; do not use straight streams.
• Dike fire control water for later disposal; do not scatter the material.

Fire involving Tanks or Car/Trailer Loads

• Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
• Do not get water inside containers.
• Cool containers with flooding quantities of water until well after fire is out.
• Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
• ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

• ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
• All equipment used when handling the product must be grounded.
• Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
• Stop leak if you can do it without risk.
• A vapor suppressing foam may be used to reduce vapors.
• DO NOT GET WATER INSIDE CONTAINERS.

• Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
• Prevent entry into waterways, sewers, basements or confined areas.

Small Spills

• Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.
• Use clean non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.

FIRST AID

• Move victim to fresh air.
• Call 911 or emergency medical service.
• Give artificial respiration if victim is not breathing.

• **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
• Administer oxygen if breathing is difficult.
• Remove and isolate contaminated clothing and shoes.

• In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
• For minor skin contact, avoid spreading material on unaffected skin.
• Keep victim warm and quiet.
• Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
• Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

ERG Guide 171

SUBSTANCES (LOW TO MODERATE HAZARD)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- Some may burn but none ignite readily.
- Containers may explode when heated.
- Some may be transported hot.

HEALTH

- Inhalation of material may be harmful.
- Contact may cause burns to skin and eyes.
- Inhalation of Asbestos dust may have a damaging effect on the lungs.
- Fire may produce irritating, corrosive and/or toxic gases.
- Some liquids produce vapors that may cause dizziness or suffocation.
- Runoff from fire control may cause pollution.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper is not available or no answer, refer to appropriate telephone number listed in Appendix B.

- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Spill

- See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY".

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

Small Fires

- Dry chemical, CO2, water spray or regular foam.

Large Fires

- Water spray, fog or regular foam.
- Move containers from fire area if you can do it without risk.
- Do not scatter spilled material with high pressure water streams.
- Dike fire-control water for later disposal.

Fire involving Tanks

- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- Do not touch or walk through spilled material.

- Stop leak if you can do it without risk.
- Prevent dust cloud.
- Avoid inhalation of asbestos dust.

Small Dry Spills

- With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

Small Spills

- Take up with sand or other non-combustible absorbent material and place into containers for later disposal.

Large Spills

- Dike far ahead of liquid spill for later disposal.
- Cover powder spill with plastic sheet or tarp to minimize spreading.
- Prevent entry into waterways, sewers, basements or confined areas.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Acrylic Acid

Synonyms: Acrylic Acid, Propenoic Acid Ethylenecarboxylic Acid, prop-2-enoic acid, $C_3H_4O_2$, $CH_2CHCOOH$

Major Uses and Sources: Acrylic acid is often used a raw material used to make acrylic esters and resins for industrial coatings. Uses include adhesives, paper and leather coatings, polishes, carpet backing compounds and tablet coatings as well as superabsorbent polymers and detergent polymers.

Hazard Identification:
Clear, colorless liquid. Flash Point: 122 F°. Flammable liquid and vapor.

Potential Acute Health Effects:
Very hazardous in case of skin contact (permeator), of eye contact (irritant, corrosive). Corrosive to skin and eyes on contact. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching.
Target Organs: central nervous system, respiratory system, eyes, skin.

First Aid Measures
Eyes: Get medical attention immediately. Immediately flush thoroughly with water for at least 15 minutes, occasionally lifting the upper and lower eyelids.

Skin: Flush skin with plenty water for at least 15 minutes, while removing contaminated clothing and shoes. Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: Get medical aid immediately. Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive Ingestion:

Fire Fighting Measures

National Fire Protection Association (U.S.A.):
Health: 3
Flammability: 2

Reactivity: 2

Flash Point..... 122°F
Auto ignition Temperature: . . . 820.4°F

Fire Extinguishing Media: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Spill Response:
For small spills, dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. For larger spills, absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed..

Physical and Chemical Properties

Boiling Point (760mm Hg)….	285.8°F (141°C)
Formula Weight (g/mol)…….	72.06
pH (Liquids Only).....	<3
Melting Point.....	57.2°F (14°C)
Vapor Pressure.@20C (mm Hg)...	3.75
Vapor Density (Air is 1).....	2.5
Solubility In Water.....	soluble
Appearance and Color.....	colorless
Specific Gravity (H_2O=1): …	1.05
Evaporation Rate……	
Odor.....	acrid (strong)
Molecular Formula.....	$C_3H_4O_2$

Transport Information

Shipping Name	Acrylic Acid
Hazard Class	8 (Corrosive material)
UN Number	UN2218
Packing Group	II
Flash Point (Closed Cup)	122°F (50°C)

Alkylbenzine Sulfonic Acid

Synonyms: Laurylbenzenesulfonic Acid, n-Dodecylbenzene Sulfonic Acid,

Major Uses and Sources: Used widely as a raw material in the manufacture of household detergents, cosmetics, and as an emulsifier in agricultural pesticides

EMERGENCY OVERVIEW: Nonflammable yellow to brown liquid, Penetrating odor. Burns can result from contact. May causes eye, respiratory and digestive irritation.

POTENTIAL HEALTH HAZARDS

SKIN: Irritation. Thermal burns can result from contact. Chronic exposure may result in redness, itching, drying, cracking, burning or inflammation of skin (Dermatitis).
EYES: Irritation. Burns can result from contact.
INHALATION: No significant adverse health effects are expected to occur from short term exposure at ambient temperatures. Breathing fumes from heating of the product can irritate the mucous membranes of the nose, throat, bronchi, and lungs.
INGESTION: Large amounts of the material may cause stomach or intestinal upset with pain, nausea, vomiting and/or diarrhea.

FIRST AID MEASURES

Remove contaminated clothing immediately. Rinse with water
SKIN: Wash skin with plenty of soap and water and rinse with water.
EYES: Wash promptly with plenty of water for at least at least 15 minutes, occasionally lifting the lower and upper lids. Get medical attention promptly.
INHALATION: Remove to fresh air. If not breathing give artificial respiration.
INGESTION: Rinse mouth and provide fresh air. Dilute by drinking milk copiously. Contact physician.

FIRE FIGHTING MEASURES

Flammable Properties
ERG GUIDE NUMBER**:** 153
NFPA HAZARD RATING**:** Flammability 0, Health 2, Reactivity 0
FLASH POINT**:** 300°F (149°C)

Fire-Fighting Measures
Extinguishing media: This material is not flammable. Use dry chemical or carbon dioxide as extinguishing media. Fire can be extinguished using foam, carbon dioxide, sand, dolomite, etc. Combustion products are carbon dioxide, carbon monoxide, and oxides of sulfur (SOx). In case of fire, cool down the packing and wear self-contained breathing apparatus.

IN CASE OF SPILL OR OTHER RELEASE:

Utilize hand and eye protection. Spilled product results in a slippery surface. Do not discharge material into natural waters without treatment. Cleanup using absorbent material and dispose. For small spills, flush area with water.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION: As a minimum, wear gloves and apron. Nonflammable boots, trousers and jacket may be used for increased protection.
EYE PROTECTION: Wear safety glasses or face shields as appropriate.
RESPIRATORY PROTECTION: Generally, none required.
ADDITIONAL RECOMMENDATIONS: When loading or unloading, remain upwind.

TRANSPORT INFORMATION
US DOT HAZARD CLASS: 8, PG lll
US DOT ID NUMBER: UN2586 (Alkyl sulfonic acids with <5% sulfuric acid)
PROPER SHIPPING NAME: Alkylbenzine Sulfonic Acid

Physical and Chemical Properties

Boiling Point (760mm Hg)….	599°F (315°C)
Formula Weight (g/mol)…….	322
pH (Liquids Only).....	<2
Melting Point.....	50°F (10°C)
Solubility In Water.....	soluble
Appearance and Color.....	light yellow to brown liquid
Specific Gravity (H_2O=1): …	1.2
Odor.....	strong penetrating odor
Molecular Formula.....	$CH_3(CH_2)_{11}C_6H_4SO_3H$

AMMONIUM NITRATE

Synonyms: Ammonium Salt, Ammonium Saltpeter
Major Uses: Crop Fertilizer, explosives, rocket propellant

Hazards Identification

EMERGENCY OVERVIEW

Appearance: White crystalline solid
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation (lung irritant). Slightly hazardous in case of skin contact (permeator). Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation.

First Aid Measures

Eyes: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.
Skin: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.
Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
Inhalation: If inhaled, remove to fresh air. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Fire Fighting Measures

General Information:
Stable Compound. Nonflammable. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool.

National Fire Protection Association

Health:	2
Flammability:	1
Reactivity:	1
Personal Protection	E

Fire Hazards in Presence of Various Substances**:** Slightly flammable to flammable in presence of heat, of combustible materials, of organic materials. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Slightly explosive in presence of heat, of combustible materials, of organic materials, of metals Do not use water jet. Use flooding quantities of water. Avoid contact with organic materials.
Special Remarks on Fire Hazards: Caution: Strong Oxidizer. Contact with material may cause a fire. Contact with combustible or organic materials may cause fire.
Special Remarks on Explosion Hazards:

It is an oxidizing agent and can self-ignite/detonate when in contact with powdered metals and some organic materials such as Urea and Acetic Acid.

Extinguishing Media:

Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

Spills/Leaks:

Small Spill - Use appropriate tools to put the spilled solid in a convenient waste disposal container. Large Spill - Oxidizing material. Stop leak if without risk. Avoid contact with a combustible material (wood, paper, oil, clothing) Keep substance damp using water spray. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Personal Protective Equipment

Eyes:

Wear Face shield and appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Full suit. Wear appropriate protective clothing to prevent skin exposure.

Respirators:

Wear appropriate respirator when ventilation is inadequate. Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH approved respirator when necessary.

Physical and Chemical Properties (Ammonium Nitrate)

Chemical Formula	NH_4NO_3
Appearance:	White crystalline solid
Odor:	Odorless
Solubility:	Soluble in water
Specific Gravity:	1.725
pH:	4.5-6.0 (1% solution) acidic
Boiling Point:	Decomposes at 210C (410F)
Melting Point:	169.6 C (337.3 F)
Vapor Density (Air=1):	N/A
Vapor Pressure:	N/A

Transport Information

Proper Shipping Name:
Hazard Class: 5.1 Oxidizing Material
Label Codes: 8 (Corrosive), 6.1 (Toxic)
UN/NA: UN 1942
Packing Group: III
Special Provisions: Marine Pollutant

CARBON DIOXIDE
(Cryogenic Liquid)

Synonyms: Carbon Dioxide
Major Uses: Aerosol propellant; carbonated soft drinks, beer, wine; chilling and refrigeration; raw material for methanol and urea production; and oil well extraction processes

Hazards Identification

EMERGENCY OVERVIEW

Carbon Dioxide is a colorless gas or a colorless, cryogenic liquid. At low concentrations, the gas is odorless. At higher concentrations it has a sharp, acidic odor. It will act as an asphyxiant and an irritant. Contact can cause freezing of exposed tissue. Moisture in the air can lead to formation of carbonic acid that can irritate the eyes. All forms of Carbon Dioxide are noncombustible. Carbon Dioxide is heavier than air and should not be allowed to accumulate in low lying areas.
Carbon Dioxide is a powerful cerebral dilator. At concentrations between 2 and 10%, Carbon Dioxide can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. Above 8% nausea and vomiting appear. Above 10%, suffocation and death can occur within minutes.

First Aid Measures

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes. Consult an ophthalmologist at once.
Skin:
Remove contaminated clothing and treat for frostbite, if necessary, by gently warming all affected areas. Consult a physician.
Inhalation:
RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS PRODUCT WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus should be worn.

Remove victim(s) to fresh air, as quickly as possible. If not breathing, qualified personnel should administer artificial respiration. Get medical attention. If breathing is difficult, administer oxygen.

Fire Fighting Measures

General Information:
Flammability: Not Flammable
Conditions of Flammability: Will not burn
Extinguishing Media: Use appropriate extinguishing media for surrounding fire.
Special Procedures: Self contained breathing apparatus required.
Firefighters should wear the usual protective gear.
Cool fire exposed containers with water spray
Personnel should be evacuated, if necessary, to upwind area
Remove containers from fire area if without risk.

National Fire Protection Association - Health: 3 Flammability: 0 Reactivity: 0
Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

Spills/Leaks:
Gas will dissipate in air
Personal Protective Equipment

Hands: Insulated neoprene gloves
Respiratory: NIOSH/ MSHA air purifying respirator for concentrations up to 10 times TLV; air supplied for higher concentrations
Ventilation: Mechanical ventilation is satisfactory. Ensure oxygen concentration remains above 19.5% and carbon Dioxide concentration does not exceed 5000 ppm. Local exhaust at points of emission preferred.

Physical and Chemical Properties (Carbon Dioxide)

Chemical Formula	CO_2
Appearance:	Cryogenic liquid and gas
Color:	Colorless
Odor:	Odorless
Solubility in water:	Slight
Boiling Point:	Sublimes to gas at -109°F
Freezing Point:	-69.8°F
Vapor Density (Air=1):	1.52

Transport Information

Proper Shipping Name: Carbon Dioxide (cryogenic liquid)
Hazard Class: 2.2 (Non-Flammable Gas)
UN/NA: UN 2187

Diesel

Synonyms: Diesel, Distillate, Cycle Oil, Fuel Oil, Diesels Cycle Oil, Furnace Oil
Major Uses: Used as a fuel in engines and heaters designed for diesel fuels.

Hazards Identification

EMERGENCY OVERVIEW

Colorless, red, blue, or amber liquid with kerosene odor. May cause eye, skin and respiratory tract irritation.

First Aid Measures

Remove all clothing impregnated with material immediately. Consult a physician for major exposures of inhalation or skin contact.

Inhalation: Remove from further exposure. If unconsciousness occurs, seek immediate medical assistance. If breathing stops, use mouth-to-mouth resuscitation.

Ingestion: DO NOT INDUCE VOMITING. Get medical assistance promptly. (Note to physician: Material if aspirated into the lungs may cause chemical pneumonitis. Treat appropriately.)

Eyes**:** Flush immediately with water for at least 15 minutes minimum. Seek medical attention promptly.
Skin: Discard contaminated leather articles. Wash contact areas with soap and water. Launder contaminated clothing before reuse.

Fire Fighting Measures

FIRE AND EXPLOSION HAZARDS

GENERAL HAZARD: Incomplete burning can produce carbon monoxide. Vapors will be released above flash point and when mixed with air, can burn or explode in confined space if exposed to sources of ignition.

Flash Point: 100^{o} F Minimum

Flammable Limits in Air: LEL - 1.3 UEL - 6

Autoignition Temperature: 490^{0} - 545^{o} F

Extinguishing Media: Use foam, dry chemical, CO_2, water fog or vaporizing liquid (Halon). Keep personnel removed from and up-wind of fire. Cool adjacent structures and storage drums with water spray. Evacuate area.

Spills/Leaks: Prevent runoff from fire control dilution from entering streams or drinking water supply. Shut off and eliminate all ignition sources. Keep people away. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place.

Contain and remove by mechanical means. Add sand, earth or other suitable absorbent to spill area then scrape off the ground. Spill may be removed from water with mechanical dredges or lifts.

Personal Protective Equipment

General: Adequate general ventilation should be provided to keep vapor and mists below exposure limits. Where there is possibility of skin contact, use the following as appropriate:

Eyes: Wear safety glasses with side shields. Wear a face shield if possibility of material splashing or spraying exists.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Use full-face shield, chemical goggles, impervious gloves, boots and whole body protection.

Respirators: Approved respiratory protection must be used when vapors or mist concentrations are unknown or exceed the TLV (100ppm). Avoid prolonged or repeated breathing of vapor or mists.

Physical and Chemical Properties (Diesel)

Chemical Formula: (approximate for #2 Diesel)	64% aliphatic hydrocarbons, (C10 - C19) 35% aromatic hydrocarbons, l% olefinic hydrocarbons
Appearance:	Colorless, red, blue, or amber liquid
Odor:	Kerosene
Solubility (20^{o}C):	0.0005 g/100 ml
Density:	0.75 - 0.90
Boiling Point:	282-338 ^{o} C
Melting Point:	-18 ^{o} C
Vapor Pressure at 20^{o}C:	0.40 mm Hg

Transport Information

Proper Shipping Name: Combustible Liquid, n.o.s. (Diesel #2)
Hazard Class: 3 (Combustible Liquid)
UN/NA: UN 1993
Packing Group: III
DOT LABELS: Flammable

FERRIC CHLORIDE
(Liquid)

Synonyms: Ferric Chloride, Iron chloride hexahydrate; ferric trichloride hexahydrate
Major Uses: Flocculant for water, industrial water, and wastewater treatment; etching medium for printed circuit boards.

Emergency Overview: DANGER! CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED. AFFECTS THE LIVER

POTENTIAL HEALTH HAZARDS

SKIN: Corrosive. Symptoms of redness, pain, and severe burn can occur.
EYES: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.
INHALATION: Extremely destructive to tissues of the mucous membranes and upper respiratory tract. Symptoms may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting.
INGESTION: Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach. Can cause sore throat,vomiting, diarrhea. Low toxicity in small quantities but larger doses (30 mg/kg) may cause nausea, vomiting and diarrhea. Pink urine discoloration is a strong indicator of iron poisoning. Liver damage, coma and death may follow, sometimes delayed as long as three days.

FIRST AID MEASURES

Skin: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.
INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
INGESTION: If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

FIRE FIGHTING MEASURES

Fire: Not considered to be a fire hazard. Irritating hydrogen chloride fumes may form in fire.
Explosion: Not considered to be an explosion hazard.
Fire Extinguishing Media: Water, dry chemical, foam or carbon dioxide. Do not allow water runoff to enter sewers or waterways.
Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.
NFPA Hazard Rating: Flammability 0, Health 2, Reactivity 2

ACCIDENTAL RELEASE MEASURES

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment.
Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

PROTECTIVE EQIPMENT

Respirators: If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection: Wear protective gloves and clean body-covering clothing.
Eye Protection: Maintain eye wash fountain and quick-drench facilities in work area. Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible.

PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Orange to brown liquid.
Odor: Acid odor.
Solubility: Complete (100%)
Specific Gravity: 1.40
% Volatiles by volume @ 21C (70F): 55-65
Boiling Point: 230C (446F)

TRANSPORT INFORMATION

Proper Shipping Name: Ferric chloride, solution
Hazard Class: 8
UN/NA: UN2582
Packing Group: III

Gasoline

Product Use: This product is intended for use as a fuel in engines or for use in engineered processes. Use in other applications may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.

Hazards of Combustion Products: Carbon monoxide and carbon dioxide can be found in the combustion products of this product and other forms of hydrocarbon combustion. Carbon monoxide in moderate concentrations can cause symptoms of headache, nausea, vomiting, increased cardiac output, and confusion. Exposure to higher concentrations of carbon monoxide can cause loss of consciousness, heart damage, brain damage, and/or death. Exposure to high concentrations of carbon dioxide can cause simple asphyxiation by displacing available oxygen. Combustion of this and other similar materials should only be carried out in well ventilated areas.

First Aid Measures

Eyes: Immediately flush eyes with large amount of water for at least 15 minutes holding lids apart to ensure flushing of the entire eye surface. **SEEK IMMEDIATE MEDICAL ATTENTION.**

Skin: Wash contaminated areas with plenty of soap and water. A soothing ointment may be applied to irritated skin after thoroughly cleansing. Remove contaminated clothing and footwear. **SEEK IMMEDIATE MEDICAL ATTENTION.**

Inhalation: Get person out of contaminated area to fresh air. If breathing has stopped resuscitate and administer oxygen if readily available. **SEEK MEDICAL ATTENTION IMMEDIATELY.**

Ingestion: Never give anything by mouth to an unconscious person. If swallowed, do not induce vomiting. If vomiting occurs spontaneously, keep airway clear. **SEEK MEDICAL ATTENTION IMMEDIATELY.**

Note to Physician: Gastric lavage only if large quantity has been ingested. Guard against aspiration into lungs which may result in chemical pneumonitis. Irregular heart beat may occur; use of adrenaline is not advised. Treat symptomatically.

Fire and Explosion Data

Flash Point: <-40 degrees (Estimated)

Auto ignition Temperature: 480 degrees F

Flammable Limits In Air: UEL: 7.1% - LEL: 1.3%

Extinguishing Media: Use dry chemical, carbon dioxide, foam or water spray. Water may be ineffective in fighting fires of liquids with low flash points, but water should be used to keep fire exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect persons attempting to stop a leak.

Special Fire Fighting Procedures: Pressure-demand, self contained, breathing apparatus should be provided for fire fighters engaged in activities in the hot zone.

Unusual Fire And Explosion Hazard: Vapors may travel extended distances and flashback with explosive force if ignition sources are present. Clothing, rags, or similar organic material contaminated with the product and stored in a closed space may undergo spontaneous combustion.

Accidental Release Measures

Eliminate all sources of ignition (flames, sparks, heat, electrical equipment, and engines) and remove non-response personnel from the spill area. Contain liquids with earthen dikes or petroleum absorbent materials. Prevent discharges to streams or sewer systems. Control vapors from large spills with fire-fighting foam. Remove liquid with

explosion-proof equipment and grounded and bonded suction hoses. Report spills or releases as required to the appropriate local, state and federal regulatory agencies.

Personal Protection/Exposure Controls

Specific Personal Protective Equipment
Respiratory: Respiratory protection is normally not required when transferring material in well ventilated areas. When transferring in enclosed areas or at high temperatures, vapors concentrations may warrant use of respiratory equipment. Use NIOSH approved respiratory protection following manufacture's recommendations. Positive pressure supplied air respiratory protection is required for IDLH areas; follow ANSI Z88.2

Eye: Face shield and goggles or chemical goggles should be worn where splashing is likely.
Gloves: Impermeable protective gloves such as nitrile gloves should be worn during routine handling of this product.
Other Clothing and Equipment: Standard work clothing is sufficient with good practices. Clothing contaminated with this product should be removed and laundered before reuse. Items which can not be laundered should be discarded. Allow contaminated items to air dry or hang in a well ventilated area. Spontaneous combustion or fire may result from contaminated materials being placed together before drying. Shower and eyewash facilities should be accessible.

Transport Information

DOT Proper Shipping Name	**Gasoline**
DOT Hazard Class*	3
DOT Packing Group (PG)	II
I.D. Number	UN 1203
Required Labeling	Flammable Liquid

SILICON TETRAFLUORIDE

Synonyms: Silicon Tetrafluoride, Tetrafluorosilane, Silicon Fluoride, Fluoro acid air
Major Uses: Used in microelectronics and for certain organic synthesis processes

Emergency Overview
Poisonous, corrosive high pressure gas. Can cause eye, skin, and respiratory tract burns. May be fatal if inhaled. Corrosive to exposed tissues. Inhalation of vapors may result in pulmonary edema and chemical pneumonitis. Nonflammable. Decomposes to hydrofluoric acid and other toxic compounds on contact with moisture.

POTENTIAL HEALTH HAZARDS

Skin: Corrosive and irritating to the skin and all living tissue. Skin burns and mucosal irritation are like that from exposure to hydrofluoric acid. Hydrofluoric acid burns exhibit severe pain, redness, possible swelling and early necrosis. Burns are progressive while any residual active fluorides are remaining.
Eyes: Corrosive and irritating to the eyes. Burns to the eyes result in lesions and possible loss of vision.
Inhalation: Corrosive and irritating to the upper and lower respiratory tracts. It hydrolyzes very rapidly, yielding hydrofluoric acid and silicic acid. Symptoms of inhalation exposure include lacrimation, cough, labored breathing excessive salivary and sputum formation. Excessive irritation of the lungs causes acute pneumonitis and pulmonary edema, which could be fatal. Chemical pneumonitis and pulmonary edema result from exposure to the lower respiratory tract and deep lung. Residual pulmonary malfunction might also occur. Extended low level absorption of fluorides may cause fluorosis, manifested as an abnormal calcification pattern of the skeletal system.
Ingestion: Ingestion is unlikely. However it is possible that breathing in high levels for prolonged periods may cause the formation of an acidic compound in the mouth, causing irritation of the mucous membranes.

FIRST AID MEASURES

Skin: Remove contaminated clothing as rapidly as possible. Flush affected area with copious quantities of water. Dermal burns may be treated with a calcium gluconate gel or slurry in water or glycerine. This compound binds the active fluorides in an insoluble form and limits burn extension while relieving pain. Seek immediate medical attention.
Eyes: PERSONS WITH POTENTIAL EXPOSURE SHOULD NOT WEAR CONTACT LENSES. Flush contaminated eye(s) with copious quantities of water. Part the eyelids to assure complete flushing. Continue for a minimum of 30 minutes. Consult a physician as soon as possible.
INHALATION: PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.
Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Unconscious persons should be moved to an uncontaminated area, and given assisted (artificial) respiration and supplemental oxygen. Keep victim warm and quiet. Assure that mucous or vomited material does not obstruct the airway by positional

drainage. Delayed pulmonary edema may occur. Keep patient under medical observation for at least 24 hours.
INGESTION: Never give liquids to an unconscious person. Do not induce vomiting. In all cases notify a physician identifying the nature of the hazard and the state of the victim. If conscious, have victim rinse mouth liberally with water, and give water to drink. Keep victim warm and quiet.

FIRE FIGHTING MEASURES

Fire: Not considered to be a fire hazard. Irritating hydrogen chloride fumes may form in fire.
Explosion: Not considered to be an explosion hazard.
Fire Extinguishing Media: None required. Use media appropriate for surrounding materials. Contact with moisture forms hydrogen fluoride and other toxic compounds.
Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.
NFPA Hazard Rating: Flammability 0, Health 3, Reactivity 2

ACCIDENTAL RELEASE MEASURES

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number.

PROTECTIVE EQIPMENT

Respirators: Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.
Skin Protection: Wear Plastic or rubber protective gloves and clean body-covering clothing.
Eye Protection: Gas tight chemical goggles or full-facepiece respirator

PHYSICAL AND CHEMICAL PROPERTIES

Odor and appearance: Colorless gas with a sharp, irritating odor
Vapor density (Air = 1): 3.55
Boiling point: -123 F (-86 C)
Freezing point: -130 F (-90 C)
Solubility: Hydrolyzes in water

TRANSPORT INFORMATION

Proper Shipping Name: Silicon Tetrafluoride
Hazard Class: 2.3 (8)
Identification Number: UN 1859
Shipping Label: POISON GAS, CORROSIVE
Additional Marking Requirement: "Inhalation Hazard"
Additional Shipping Paper Description Requirement: "Poison-Inhalation Hazard, Zone D"

Sodium Hydroxide

Product Identification
Synonyms: Caustic soda; lye; sodium hydroxide solid; sodium hydrate

Emergency Overview

POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT. REACTS WITH WATER, ACIDS AND OTHER MATERIALS.

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White Stripe (Store Separately)

First Aid Measures

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion: DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing before reuse.
Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Fire Fighting Measures

Fire: Not considered to be a fire hazard. Hot or molten material can react violently with water. Can react with certain metals, such as aluminum, to generate flammable hydrogen gas.
Explosion: Not considered to be an explosion hazard.
Fire Extinguishing Media: Use any means suitable for extinguishing surrounding fire. Adding water to caustic solution generates large amounts of heat.
Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.
NFPA Hazard Rating: Flammability 0, Health 2, Reactivity 2

Personal Protective Equipment

Personal Respirators (NIOSH Approved): If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration

specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection: Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Physical and Chemical Properties

Appearance: White, deliquescent pellets or flakes.
Odor: Odorless.
Solubility: 111 g/100 g of water.
Specific Gravity: 2.13
pH: 13 - 14 (0.5% soln.)
% Volatiles by volume @ 21C (70F): 0
Boiling Point: 1390C (2534F)
Melting Point: 318C (604F)
Vapor Density (Air=1): > 1.0
Vapor Pressure (mm Hg): Negligible.
Evaporation Rate (BuAc=1): No information found.

Transport Information

Proper Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN/NA: UN1823
Packing Group: II

Sodium Hypochlorite

Synonyms: Bleach; hypochlorous acid, sodium salt; soda bleach; sodium oxychloride
Major Uses: Flocculant for water, industrial water, and wastewater treatment; etching medium for printed circuit boards.

Emergency Overview: WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. CAUSES SUBSTANTIAL BUT TEMPORARY EYE INJURY.

POTENTIAL HEALTH HAZARDS

SKIN: May irritate skin.
EYES: Contact may cause severe irritation and damage, especially at higher concentration..
INHALATION: May cause irritation to the respiratory tract, (nose and throat); symptoms may include coughing and sore throat.
INGESTION: May cause nausea, vomiting.

FIRST AID MEASURES

Remove contaminated clothing immediately. Rinse with water
SKIN: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
EYES: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately..
INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
INGESTION: If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

FIRE FIGHTING MEASURES

Fire: Not considered to be a fire hazard. Substance releases oxygen when heated, which may increase the severity of an existing fire. Containers may rupture from pressure build-up.
Explosion: This solution is not considered to be an explosion hazard. Anhydrous sodium hypochlorite is very explosive
Fire Extinguishing Media: Use any means suitable for extinguishing surrounding fire. Use water spray to cool fire-exposed containers, to dilute liquid, and control vapor.
Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.
NFPA Hazard Rating: Flammability 0, Health 2, Reactivity 1

ACCIDENTAL RELEASE MEASURES

Ventilate area of leak or spill. Wear appropriate personal protective equipment. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

PROTECTIVE EQIPMENT

Respirators: If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection: Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area

PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Colorless to yellowish liquid.
Odor: Chlorine-like odor.
Solubility: 100% in water.
Density: 1.07 - 1.14
pH: 9 - 10 (neutral solution-no excess sodium hydroxide)
Boiling Point: 40°C (104°F) Decomposes slightly
Melting Point: -6°C (21°F)
Vapor Pressure (mm Hg): 17.5 @ 20°C (68F)

TRANSPORT INFORMATION

Proper Shipping Name: Sodium Hypochlorite, solution
Hazard Class: 8
UN/NA: UN1791
Packing Group: II

Appendix B

Emergency Response Telephone Numbers

- **CHEMTREC** **1-800-424-9300**
- **CHEM-TEL** **1-800-255-3924**
- **INFOTRAC** **1-800-535-5053**
- **3E Company** **1-800-451-8346**
- **National Response Center (NRC)** **1-800-424-8802**
- **Military Shipments**
  - **Explosives/ammunition incidents** **703-697-0218**
  - **All other dangerous goods incidents** **1-800-851-8061**
- **Nationwide Poison Control Center** **1-800-222-1222**