

Johnson County Hazardous Commodity Flow Study





The purpose of a Hazardous Commodity Flow Analyses

The purpose of a hazardous material commodity flow analysis is to examine chemical transportation via local transportation modes for the purpose of identifying and quantifying hazardous substances moved along a specific transportation route, through a geographical area or past a given point. The result of a hazardous material commodity flow analysis is a clearer picture of the potential threat posed by chemical transportation and guidance that will aid in planning, preparedness and response efforts. Such a study should:

- Identify commodities transported through a geographical area
- Identify hazardous commodity routes
- Determine unique transportation containers
- Assess the potential impact of hazardous commodity releases, should they occur, along studied routes
- Provide guidance to emergency responders and managers relative to hazardous commodity transportation emergencies in terms of

- Preventative measures
- Preparedness measures
- Training efforts
- Specialized equipment needs
- Identify potential chemical “targets of opportunity” that could be readily weaponized and utilized as chemical weapons by terrorists

The intent of the Johnson County Hazardous Commodity Flow Analysis

The Johnson County Hazardous Commodity Flow Analysis is an examination of hazardous material transportation through Johnson County via highway routes. The specific transportation routes that have been examined as a part of this study are as follows:

Highway

Interstate 80

Highway 1

Highway 218

Background: Hazardous Materials Transportation in Johnson County

Johnson County and the Iowa City/Coralville area are significant transportation corridors with tremendous volumes of hazardous substances moved on a daily basis.

Highway routes are placed under surveillance for a period of time determined by the Johnson County LEPC. Projected volumes of hazardous



materials moving via the County's highway system are extrapolated based on those

surveillance hours and multiplied by a factor of three or six, as appropriate in order to estimate or approximate volumes in a 24-hour period.

The Significance of Various Transportation Modes

Each mode of transportation utilized for the conveyance of hazardous substances poses a unique challenge to the emergency management and response community. Some of the considerations peculiar to highway transportation are as follows:

Highway: Highway accidents involving hazardous material transportation have a great potential for public exposures since shipments share the roadway with passenger vehicles and traverse areas in close proximity to vulnerable exposures. This necessitates some preparatory measures to help ensure timely and effective response. These measures include:

- Familiarity with patient decontamination procedures conducted in the field and hospital setting
- Handling of contaminated accident victims from non-terrorist chemical accidents should be planned and exercised, and focus should be placed on the critical hazard communications that must take place between fire, HAZ MAT, EMT and hospital personnel
- A focus on the role of emergency responders at the operations level-fire fighters, law enforcement personnel and EMTs- and their ability to handle

contaminated patients. Because the chemical volumes involved in highway accidents are somewhat more manageable, there is a greater likelihood that local emergency responders can and will have more in-depth and hands-on involvement in managing the overall incident, including handling damaged containers and released product

- The various local emergency response agencies should explore and clarify issues related to jurisdiction, command issues and traffic management. It is not uncommon for jurisdictional tensions to occur during the management of a highway chemical emergency, where local law enforcement, the Highway Patrol, Department of Transportation and local emergency response agencies all share responsibility for critical aspects of emergency management, but differ in how they might prioritize response objectives. Incident command integration and the establishment of a unified command should be explored, and working relationships and points of contact established. It is a common occurrence for fire and hazardous material responders to request the closing of transportation routes during an emergency response, however implementation of this request is typically the task of law enforcement and transportation officials who must determine routes that are appropriate both for the flow and weight of vehicles. This issue alone can be the source of emergency management disagreements and should be addressed prior to an actual response.

- Alternate routes for traffic traversing the Interstates should be predetermined and changeable message signs, if not already present, should be considered as a means of communicating with motorists during a chemical emergency.
- Sources of assistance with off-loading or transferring product from the various cargo trailers should be pre-identified and transfer operations practiced and/or included in training. Emergency responders should have a clear idea of required transfer times for these containers so that transportation personnel can more effectively plan for the disruption.

Concerns Related to Homeland Security: Highway transportation of hazardous materials frequently involves large volumes of hazardous liquids, gases and solids. Although the potential liquid volume (typically not exceeding 9000 gallons) does not approach that associated with rail transportation, it is however, significant. These large volumes pose a substantial threat when released, resulting in lengthy responses that can place strenuous demands on local resources and cause significant interruptions. Their greater mobility in the community poses a challenge to Homeland Security professionals,



as these shipments could be readily “weaponized” and used as WMDs of opportunity. Special attention should be paid to bulk shipments of gaseous toxics such as ammonia, chlorine and sulfur dioxide and the routing utilized by carriers.

Surveillance of the Interstate 80 to

Highway 218 route as well as the 218 route alone revealed significant volumes of extremely hazardous materials in the midst of high-density commercial, institutional and residential areas. When this is factored with the routine extreme-density public assembly events, a very vulnerable WMD target scenario becomes evident. A release of a heavy toxic gas at several points along the Interstate 80 route in the Corallville and Iowa City areas would migrate to low areas along the river and shopping areas as well as into high density traffic routes utilized for football games. Due to the topography of the area, gravity would drive gas migration as much as wind direction.

Due to the tremendous volume of chemicals transported in specialized transport trailers, the Iowa City Hazardous Materials Team should be provided the opportunity to attend highway specialist training at the Association of American Railroad's Transportation Test Center in Pueblo, Colorado. If local budget is insufficient to support this training, grant funding or support from local transporters should be sought. A hazardous materials team in a jurisdiction with such a huge volume of highway transportation should be very familiar with the intricacies of special highway transport containers such 306/406, 307/407, 312/412, 331, intermodal, cryogenic and van-type trailers.

Using commodity flow figures as a basis, operations level personnel representing law-enforcement, the fire service and emergency medical services should clearly understand the limitations of standard fire fighter or other forms of standard protective clothing. For example, the North American Emergency Response Guidebook states that structural fire fighter protective clothing is not effective in spill situations involving anhydrous

ammonia and may result in burns or severe injury. Likewise, this clothing is not adequate protection for contact with solvents, pesticides, corrosives or cryogens and emergency operations should be limited to those of a defensive nature involving no potential for contact with the substance. Operations that may entail intimate contact (i.e. drenching, splashing or immersion) with these substances should be conducted in specialized chemical protective clothing.

Transportation Data-Highway



The following information reflects the data gathered for the various transportation routes studied in Johnson County. For each route the information will include estimated total hazardous material volume and an indication of whether the volume is based on operator supplied inventories or surveillance. Additionally, where

possible, volumes for specific hazard classes (i.e. flammable liquid, corrosive, flammable solid, etc.) will be provided as well as the estimated chemical volume in specific container types. For highway transportation, estimates for a 24-hour period will be extrapolated based on an eight or four hour observation window as specified by the Johnson County LEPC.

The information gathered as a result of surveillance has been placed into a spreadsheet that allows for ready review and route comparison.

Each highway route studied has been assigned a **“Route Risk Factor”** as appropriate.

The highway risk factors are as follows:

HVF High-volume Fuel Transportation

HVTT Heavy Van Trailer Traffic

HVL High Volume of Liquids

H331 High Volume of 331 Transports

These Risk Factors and the associated implications and recommended actions are detailed in Appendix C. The Route Risk Factors represent unique challenges as indicated below.

Highway Route and Mode-specific Factors

HVF-High-volume Fuel Transportation

The high-volume of highway fuel transportation along studied routes make virtually inevitable significant incidents involving MC-306/406 transports. Accidents involving these trailers are significant for number of reasons, such as the 8000 gallon fuel volume they carry, the rather fragile nature of the 1/4 inch aluminum tank shell and the likelihood that a mishap involving these tanks will result in a long term incident blocking a major thoroughfare. In anticipation of these accidents, a number of preparations would be recommended. Many of these recommendations have likely already been addressed by local emergency responders including the Iowa City and Coralville Fire Departments and the Johnson County Emergency Management office

HVTT-Heavy Van Trailer Transportation

The large number of highway shipments of hazardous materials in van-type trailers poses a unique potential problem for emergency responders. Accidents involving these shipments can involve extensive manual labor, frequently in chemical protective clothing. These incidents tend to be very time-consuming and can interrupt traffic movement for many hours. It is typical that a portion of the load must be removed from the trailer in order to access damaged and/or leaking chemical containers. This is extremely difficult and sometimes dangerous, due to shifting loads and traffic, for emergency responders to accomplish along a roadway.

HVL-High Volume of Liquids

The extremely high-volume of hazardous liquids transported through Johnson County necessitate preparations and the identification of equipment capable of both containing and recovering these liquids.

H331

In light of the high number of MC-331/431 tankers conveying both propane and anhydrous ammonia, pre-planning should be conducted to It is recommended that preparations be made to implement a large-scale evacuation or shelter-in-place along transportation routes for the worst case accidents involving these shipments. As is

obvious from the vulnerable zone maps, there are potentially large geographical areas that may be impacted as a result of a release from these trailers.

Transportation Vulnerable Zones

Utilizing CAMEO software developed by the National Oceanic and Atmospheric Administration, vulnerable zones along transportation routes were identified. CAMEO stands for "computer-aided management of emergency operations". It is chemical emergency management software that includes a chemical release plume modeling and mapping function. The CAMEO program allows site, meteorological and chemical specific information to be entered into the screening and scenario portions of the software where vulnerable zones surrounding a point of chemical release can be identified on census map segments. This function is an extremely useful planning and emergency response tool, giving a community an approximate idea of the geographical area potentially impacted as a result of a chemical release. In order to arrive at a vulnerable zone, some assumptions must be made regarding the type of release and meteorological conditions. The federal Environmental Protection Agency (EPA) has developed worst case scenario recommendations for this planning process. EPA's recommendations for credible worst case assumptions include a total release of the contents of the largest single or manifolded container within a ten-minute time period into a totally stable (class F) atmosphere. This tends to result in unlikely vulnerable zones of such massive proportions, that emergency planners have a difficult time identifying where to begin the planning process. It is possible with CAMEO to adjust worst case assumptions to reflect more likely or more typical conditions. The assumptions made upon which vulnerable zones are based were modified to reflect more likely atmospheric conditions. In lieu of assuming a stable atmosphere, an average Iowa wind speed of twelve miles per hour and a stability class of C were utilized. It was assumed the release takes place in an urban

setting, where structures and vegetation aid in gas/vapor dispersion. Other EPA credible worst case assumptions, specifically the total release time period were retained and utilized in the formula. For highway transportation routes, the most toxic substance likely to become airborne and form a plume, which may migrate away from the point of release and travel distances sufficient to pose a significant public health threat, is anhydrous ammonia. Nearly all highway routes in Johnson County are used for the transportation of anhydrous ammonia in MC 331 trailers containing approximately 10,000 gallons or 60,000 pounds of product. Therefore this specific trailer transporting anhydrous ammonia was used as the basis for estimating vulnerable zones along highway routes. The vulnerable zone radius for a ten-minute release of 60,000 pounds of anhydrous ammonia during a twelve mile per hour wind and class C stability is .9 miles. A vulnerable zone is identified for planning purposes as an area where it may be anticipated that airborne concentrations of a released hazardous substance may reach one-tenth of the concentration considered to be immediately dangerous to life and health (IDLH). An IDLH atmosphere is one that will kill or incapacitate within a 30-minute period of time. It is recommended by EPA that the actual IDLH not be utilized for planning purposes, as it does not accurately reflect the actual time of exposure for individuals who may be in the area of a release. Following are vulnerable zones and scenario assumptions for each of the studied routes in Johnson County.

Definitions

Combustible liquid: liquids, which have a flash point greater than 141 degrees Fahrenheit and below 200 degrees Fahrenheit. United States' regulations permit a flammable liquid flashing between 100 degrees Fahrenheit and 140 degrees Fahrenheit. Kerosene and diesel fuel are two of the most common examples of combustible liquids.

Corrosive: any liquid or solid that causes destruction of human skin tissue or a liquid that has a severe corrosion rate on steel or aluminum

Cryogenic liquid: a refrigerated liquefied gas that has a boiling point colder than -130 degrees Fahrenheit at atmospheric pressure. Liquefied oxygen, helium, argon and nitrogen are some of the most common cryogenic liquids transported.

Flammable liquid: a liquid that has a flash point of 141 degrees Fahrenheit or lower. Solvents, gasoline and alcohol are common flammable liquids.

Flash point: the lowest temperature at which a liquid or solid gives off vapor in such a concentration that, when the vapor combines with air near the surface of the liquid or solid, a flammable mixture is formed, capable of being ignited with an ignition source.

Intermodal container: a commonly used shipping container of various dimensions and suitable for conveying goods by water, rail or highway.

Oxidizer: a chemical which supplies its own oxygen or oxidizing agent and which helps other combustible materials burn more readily and potentially violently. Ammonia nitrate is a common oxidizer, as is oxygen in gaseous and liquefied form.

Radioactivity: the property of some substances to emit invisible and potentially harmful radiation.

Vulnerable Zones-Highway

Interstate 80

Vulnerable Zones-Highway

Highway 218

Vulnerable Zones-Highway

Highway 6

Johnson County Hazardous Commodity Flow Analysis-Route and Mode Specific Risk Factors		
Route and Mode Factor Code	Route and Mode Risk Factors	Factor Implications and Recommended Actions
HVF	High-volume Fuel Transportation	Hazardous materials technician level training in the MC306/406 tank drilling and off-loading operation
		A supply of hydrophobic booms with sweeps and the water craft necessary to deploy them should a petroleum release enter a natural body of water
		Pre-emergency planning and close coordination with a petroleum recovery contractor and the Coast Guard for releases that enter a waterway
		The location of an off-load tanker with pumping capability, additional suction and discharge hoses, miscellaneous cam-lock petroleum type fittings and 24-hour contacts for the company willing to supply fuel pumping assistance during an emergency
		concentrates
		An established relationship with a wrecker service experienced in righting tank vehicles, and if possible HAZWOPER trained
		Pre-emergency planning for storm sewer operations including familiarity with storm sewer out-falls and access to sewer maps. Planning should include the deployment of air monitoring teams to monitor flammable vapor concentrations in sewers and should ant
		Access to explosion-proof trash pumps capable of pumping petroleum contaminated with soil
		stationary
		Familiarity with water shuttle operations, as tanker incidents frequently happen along roadways unequipped with fire hydrants
		The formation of a highway incident management team, if one does not already exist, to preplan and coordinate response to lengthy incidents impacting or totally interrupting major transportation routes. It is not uncommon for tanker accidents to take six
HVTT	Heavy Van Trailer Traffic	Emergency responders should have access to metal cutting capabilities as it is frequently most expedient to access chemical loads via the roof of overturned trailers
		Materials necessary for blocking, bracing, cribbing or otherwise stabilizing trailers, tractors and loads should be available to emergency responders
		Equipment such as winches, bobcats or off-road forklifts may be necessary to unload a trailer and should be identified along with contact information during pre-emergency planning
		A supply of pallets should be identified for re-palletizing damaged loads
		Highway incident planning should make preparation for a lengthy tie up of the transportation route that would likely result from a van-type trailer accidents involving hazardous materials
		If possible, an open dock area in close proximity to major roadways should be identified and working agreements established with owners who will allow its use when it is possible to move a leaking load off of a roadway to avoid major traffic tie-ups. Thi
		24-hour access to equipment such as a pallet jack, pallet grabbers and forklifts should be preplanned.
HVL	High Volume of Liquids	Containment preparations should include the location of damming and diking material such as sand and dirt as well as the equipment to transport and place it.
		Working agreements should be established with public works or excavation contractors capable of assisting with an emergency, and discussions should factor OSHA HAZWOPER requirements and training levels for any assisting personnel. Anyone assisting in thi
		The Iowa City Hazardous Materials Team should be equipped with at least one chemical resistant "trash pump" capable of initiating liquid recovery operations. Progressing cavity and diaphragm pumps are well suited to this service. Additional inventories
		The huge volumes of hazardous liquids and gases conveyed in specialized highway tanks make it critical that the Iowa City Hazardous Materials Team receives training for a sufficient number of personnel at the Association of American Railroads Transportati
H331	High Numbers of MC331 Transports	Identify transporters in order to preplan and coordinate emergency operations.
		Identify transporters capable of off loading these commodities from damaged tankers and when appropriate, flaring of contents and righting of overturned trailers.

Johnson County Hazardous Commodity Flow Study							
Transportation mode: Highway							
Route: Interstate 80							
Surveillance duration: 8 hours							
Total trucks: 3095							
Total trucks placarded: 207							
%Trucks placarded: app. 6.5%							
Total trucks-vans: 2888							
%Total trucks-vans: app. 94%							
ROUTE RISK FACTORS: HVTT, HVF, HVL, H331							
Trailer type	Number observed	Trailer capacity	Potential capacity-placard basis	Surveillance duration (hrs.)	24-hour volume extrapolation	Hazardous commodities typically transported in this vessel	Hazardous commodities observed
Van	2888	N/A			8664	misc	
Van-poison	2		4000#	8 hours	12,000#	misc	poisons, pesticides
Van-corrosive	39		78,000#	8 hours	234,000#	misc	acids, caustics
Van-oxidizer	1		2000#	8 hours	6000#	misc	oxidizers
Van-flammable liquid	29		58,000#	8 hours	174,000#	misc	paints, solvents
Van-flammable solid, dangerous when wet	3		any amount	8 hours	any amount	calcium carbide, metallic sodium, aluminum phosphide	unknown
Van-dangerous	3		12,000#	8 hours	36,000#	misc	various hazardous commodities in mixed loads
Van-flammable gas	7		14,000#	8 hours	42,000#	propane, acetylene, butane	unknown
Van-flammable solid	2		4000#	8 hours	12,000#	matches, charcoal	unknown
Van-explosive	3		any amount	8 hours	any amount	explosives, blasting agents, military ordinance	unknown
Van-non-flammable gas	7		14,000#	8 hours	42,000#	carbon dioxide, helium, nitrogen	unknown
MC338-flammable gas	1	8000 gallons	8000 gallons	8 hours	24,000 gallons	cryogenic gases	liquid hydrogen
MC338-non-flammable gas	4	8000 gallons	32,000 gallons	8 hours	96,000 gallons	cryogenic gases	carbon dioxide, helium, nitrogen
MC331		10,000 gallons		8 hours		LP and anhydrous ammonia	
MC331-ammonia	4	10,000 gallons	40,000 gallons	8 hours	120,000 gallons	LP and anhydrous ammonia	ammonia
MC331-LP	17	10,000 gallons	170,000 gallons	8 hours	510,000 gallons	LP and anhydrous ammonia	LP
MC306/DOT406	54	9000 gallons	486,000 gallons	8 hours	1,458,000 gallons	flammable/combustible liquids, pesticides, mild corrosives	liquid motor fuels
MC307/DOT407	1	6000 gallons		8 hours		flammable and combustible liquids, pesticides, mild corrosives and elevated temperature products	
MC307/DOT407-flammable liquids	13	6000 gallons	78000 gallons	8 hours	234,000 gallons	flammable and combustible liquids, pesticides, mild corrosives and elevated temperature products	solvent
MC307/DOT407-corrosives	10	6000 gallons	60,000 gallons	8 hours	180,000 gallons	flammable and combustible liquids, pesticides, mild corrosives and elevated temperature products	acids and bases
MC307/DOT407-oxidizers	1	6000 gallons	6000 gallons	8 hours	18,000 gallons	flammable and combustible liquids, pesticides, mild corrosives and elevated temperature products	hypochlorite solution
MC307/DOT407-elevated temperature commodity	1	6000 gallons	6000 gallons	8 hours	18,000 gallons	flammable and combustible liquids, pesticides, mild corrosives and elevated temperature products	asphalt
MC312/DOT412		5000 gallons		8		concentrated acids and bases-highly corrosive	

Trailer type	Number observed	Trailer capacity	Potential capacity-placard basis	Surveillance duration (hrs.)	24-hour volume extrapolation	Hazardous commodities typically transported in this vessel	Hazardous commodities observed
MC312/DOT412-corrosives	6	5000 gallons	30,000 gallons	8	90,000 gallons	concentrated acids and bases-highly corrosive	concentrated hydrochloric, sulfuric acids and sodium hydroxide
MC312/DOT412-oxidizers	2	5000 gallons	10,000 gallons	8	30,000 gallons	concentrated acids and bases-highly corrosive	nitric acid

Johnson County Hazardous Commodity Flow Study							
Transportation mode: Highway							
Route: Highway 1							
Surveillance duration: 4 hours							
Total trucks: 670							
Total trucks placarded: 42							
%Trucks placarded: app. 6.5%							
Total trucks-vans: 630							
%Total trucks-vans: app. 95%							
ROUTE RISK FACTORS: HVTT, HVF, HVL							
Trailer type	Number observed	Trailer capacity	Potential capacity-placard basis	Surveillance duration (hrs.)	24-hour volume extrapolation	Hazardous commodities typically transported in this vessel	Hazardous commodities observed
Van	630						
Van-flammable gas	1	unknown	2000#	4	12,000#	CO2, nitrogen, helium	
Van-non-flammable gas	1	unknown	2000#	4	12,000#	LP, acetylene,	
MC306/DOT406	4	9000 gallons	36,000 gallons	4	216,000 gallons	flammable/combustible liquids, pesticides, mild corrosives	liquid motor fuels
MC331/DOT331	1	10,000 gallons	10,000 gallons	4	60,000 gallons	NH3/LP	LP
Route: Highway 218							
Surveillance duration: 4 hours							
Total trucks: 712							
Total trucks placarded: 59							
%Trucks placarded: app. 8.5%							
Total trucks-vans: 675							
%Total trucks-vans: app. 95%							
Trailer type	Number observed	Trailer capacity	Potential capacity-placard basis	Surveillance duration (hrs.)	24-hour volume extrapolation	Hazardous commodities typically transported in this vessel	Hazardous commodities observed
Van	675						
Van-flammable liquid	1	unknown	2000#	4	12,000#	solvents, paints	
Van-corrosive	10	unknown	20,000#	4	120,000#	acids and bases	
MC306/DOT306	31	9000 gallons	279,000 gallons	4	1,674,000 gallons	flammable/combustible liquids, pesticides, mild corrosives	liquid motor fuels
MC331/DOT331		10,000 gallons		4		NH3/LP	
MC331/DOT331-NH3	1	10,000 gallons	10,000 gallons	4	60,000 gallons	NH3/LP	NH3
MC331/DOT331-LP	5	10,000 gallons	50,000 gallons	4	300,000 gallons	NH3/LP	LP
MC307/DOT307		6000 gallons		4		flammable and combustible liquids, pesticides, mild corrosives and elevated temperature products	
MC307/DOT307-elevated temperature commodities	1	6000 gallons	6000 gallons	4	36,000 gallons	flammable and combustible liquids, pesticides, mild corrosives and elevated temperature products	asphalt
MC307/DOT307-flammable liuqids	1	6000 gallons	6000 gallons	4	36,000 gallons	flammable and combustible liquids, pesticides, mild corrosives and elevated temperature products	solvent
MC312/DOT412	8	5000 gallons	40,000 gallons	4	240,000 gallons	concentrated acids and bases-highly corrosive	nitric acid, hydrochloric acid, sodium hydroxide
MC338/DOT338	1	8000 gallons	8000 gallons	4	24,000 gallons	cryogenic gases-liquid nitrogen, helium, argon, oxygen, hydrogen	carbon dioxide
ROUTE RISK FACTORS: HVTT, HVF, HVL							

Highway Cargo Transports Observed During the Johnson County Hazardous Commodity Flow Study



Straight truck, cargo van, van-type trailer

Many shipments of hazardous commodities are carried via common **straight trucks, cargo vans or van-type trailers**. Trailers may be single or double bottom, and most are constructed with steel framing and floor supports, wood or steel flooring and lightweight side wall and roof construction, most frequently of aluminum. Shipments of hazardous materials in straight trucks or cargo trailers may take many forms including, 300-600 gallon tote bins, 55 gallon or other capacity steel or plastic drums, bags, boxes, cylinders, bottles or other types of containers. These materials may be liquid, solid or gaseous.

Challenges to Emergency Responders and Managers

- Cargo can be difficult to access along a roadway
- Cargo access may require roof entry and/or pallet jacks, winches, forklift and other cargo moving equipment not readily available
- Difficulty and delays accessing cargo can lead to long road closure or restriction
- Open docks near congested roadways should be identified so that when possible and safe, trailers can be moved from roadways

Highway Cargo Transports Observed During the Johnson County Hazardous Commodity Flow Study

MC306/DOT406 Cargo Tanker

The most common trailer used for the transport of hazardous liquids is the **MC306/DOT406 trailer**. It is frequently a multi-compartment trailer capable of transporting approximately 8,000 gallons of liquid. It is most commonly of aluminum construction, but may be made of steel. It is most frequently used for the transportation of common fuels such as gasoline, diesel fuel and aviation fuel.



Challenges to Emergency Responders and Managers

- Cannot be righted with product inside. Requires off-loading if overturned
- Off-loading overturned tanker requires OSHA HAZ MAT Technician level personnel and knowledge of the unique process
- Thin ¼ inch aluminum tank susceptible to mechanical damage in accidents. Can easily release compartment contents in overturns and collisions
- May contain mixed loads with different commodity in each compartment
- Potential to release large volume that can quickly migrate to waterways or sewers
- Off-loading requires off-load tanker with pumping capability and assortment of hoses and fittings
- Sewer-borne releases can ignite and vapors may explode
- Accident handling may require an assortment of costly non-sparking or explosion-proof equipment
- Likely to result in length closures of roadways if overturned

Highway Cargo Transports Observed During the Johnson County Hazardous Commodity Flow Study

MC312/DOT412



Typically constructed of stainless steel, but may be of composite construction or steel with composite lining. The MC312/DOT412 is a narrower diameter tank with stiffening rings to support the transportation of dense acids and bases. The stiffening rings may not be visible on a double-walled tank. The tank capacity ranges from 4000-5000 gallons. This tank is used almost exclusively for the transportation of concentrated corrosives. The internal valve system may be cable operated, but is most frequently air operated and fails closed upon loss of air pressure or exposure to extreme heat. The system is equipped with remote emergency shutoffs to halt the flow of product in an emergency.

Challenges to Emergency Responders and Managers

- Tank cannot be righted with product inside
- Drill and pump operations used for MC306/DOT406 not intended for use on this tank
- Removing product from overturned tank may require removal of piping/internal valving or dome cover, resulting in substantial product loss
- Liquids are aggressive, requiring careful selection of transfer pumps, hoses, fittings and receiving vessels
- Emergency responder lack of familiarity with the tank may result in long delays while technical specialists respond to the scene
- Fire fighter protective clothing will not provide adequate protection for the commodities transported

Highway Cargo Transports Observed During the Johnson County Hazardous Commodity Flow Study



MC307/DOT407

The **MC307/407 trailer** is typically constructed of stainless steel and has a larger diameter than the MC312/412. It has tank-stiffening rings and may be a single or double wall trailer. The stiffening rings may not be visible on a double-walled tank. Its capacity ranges from approximately 5-10,000 gallons and it may be utilized to transport flammable liquids, poisons, corrosives and a wide array of liquid substances.

Challenges to Emergency Responders and Managers

- Tank cannot be righted with product inside
- Drill and pump operations used for MC306/DOT406 not intended for use on this tank
- Removing product from overturned tank may require removal of piping/internal valving or dome cover, resulting in substantial product loss
- Tank may be multi-compartment with different commodities in each compartment
- Emergency responder lack of familiarity with the tank may result in long delays while technical specialists respond to the scene
- Fire fighter protective clothing will not provide adequate protection for the commodities transported

Highway Cargo Transports Observed During the Johnson County Hazardous Commodity Flow Study



MC338

Cryogenic liquids are transported in heavily insulated the double-walled **MC338** trailers designed to keep these super-cool liquids from evaporating. These trailers range in capacity from a few thousand to several thousand gallons of liquid.

Challenges to Emergency Responders and Managers

- Tank cannot be righted with product inside
- Drill and pump operations used for MC306/DOT406 not intended for use on this tank
- The tremendous expansion ratios of these liquids make it critical that pressure relief/venting devices attached to the tank be kept clear and operable. Expanding vapor explosion may result
- Liquids pose an extreme frostbite potential
- Emergency responder lack of familiarity with the tank may result in long delays while technical specialists respond to the scene
- Handling and off-loading of product should be attempted only by industry experts
- Liquids may saturate and freeze road materials causing subsequent explosion as gases heat and expand in saturated roadway materials
- Fire fighter protective clothing will not provide adequate protection for the commodities transported

Highway Cargo Transports Observed During the Johnson County Hazardous Commodity Flow Study



MC331

Anhydrous ammonia and liquefied petroleum gas are most often transported in the single-wall **MC331 trailer**. It is of steel construction with a capacity of approximately 10,000 gallons. Internal valves that allow the flow of product to external valves and off-loading piping may be controlled by cable, pneumatic or hydraulic systems designed to fail closed upon the loss of pressure (pneumatic and hydraulic) or exposure to extreme heat. Each is equipped with remote emergency shutoffs.

Challenges to Emergency Responders and Managers

- Tank may be righted with product inside following a careful damage assessment by trained personnel examining both tank shell and damage along heat affected zones near welds.
- Drill and pump operations used for MC306/DOT406 not intended for use on this tank
- The expansion ratios of these liquids make it important that pressure relief/venting devices attached to the tank be kept clear and operable. Overpressure of tank may result.
- Liquids pose a frostbite potential and their expansion ratios can result in large vapor clouds generated from even small releases.
- Emergency responder lack of familiarity with the tank may result in long delays while technical specialists respond to the scene
- Handling and off-loading of product should be attempted only by industry experts
- Liquids may saturate and freeze road materials causing subsequent explosion as gases heat and expand in saturated roadway materials
- Fire fighter protective clothing will not provide adequate protection for the commodities transported