U.S.Department
of Transportation
**Research and
Special Programs
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

APR - 5 2001

Mr. Otis T. Eanes
Bridge Tunnel Patroller
Monitor-Merrimac Memorial Bridge Tunnel
P.O. Box 6570
Portsmouth, Virginia 23703

Ref. No. 01-0058

Dear Mr. Eanes:

Thank you for your February 8, 2001 letter to Secretary of Transportation Norman Mineta. Your letter has been referred to this office for response. You ask about state and local routing requirements for the transportation of hazardous materials and specifically about restrictions on the transportation of certain hazardous materials through tunnels.

The Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) set forth requirements for persons who offer hazardous materials for transportation or transport hazardous materials in commerce. The HMR explain how to class and package a hazardous material and how the package must be marked and labeled. The HMR also tell how to complete the shipping papers and emergency response information that must accompany a hazardous material shipment. In addition, the HMR tell whether the vehicle in which a hazardous materials shipment is being transported must be placarded and the specific placards that must be used. Finally, the HMR explain training requirements for persons who transport hazardous materials or prepare hazardous materials for shipment.

Hazardous materials transported in commerce, including on state- or privately-owned bridges and tunnels, must conform to all applicable requirements of the HMR. In addition, regulations issued by the Federal Motor Carrier Safety Administration (FMCSA) at 49 CFR Part 397 provide general routing standards for states and Indian tribes that wish to establish highway routing designations for non-radioactive hazardous materials (NRHM). Generally, these regulations require a state or tribal government to make a public finding that NRHM routing designations enhance public safety in both the area subject to its jurisdiction and other areas that are directly affected by the routing designation. In establishing routing designations, a state or Indian tribe must consider a number of factors, including the population potentially exposed to an NRHM release; the characteristics of the highway; the types and quantities of NRHM expected to be transported on the designated route; emergency response capabilities; and exposure and other risk factors. So long as states and Indian tribes comply with these general standards, they have broad discretion to develop routing designations for NRHM. State officials are better positioned than is the federal government to assess local bridge or tunnel conditions, accident histories, emergency

response capabilities, alternative routes, and exposure and other risk factors in making such decisions. Similarly, we believe state authorities should be responsible for enforcing any bridge or tunnel restrictions and for training their employees to enforce the restrictions. You should discuss any concerns you may have about hazardous materials transported through the Monitor-Merrimac Memorial Bridge Tunnel with your supervisor.

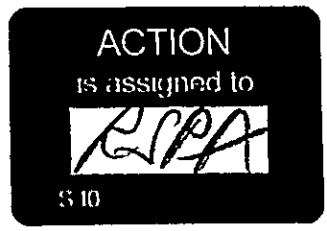
I hope this information is helpful. If you have further questions, please do not hesitate to contact this office.

Sincerely,

Edward T. Mazzullo

Edward T. Mazzullo, Director
Office of Hazardous Materials Standards

Gorsky
§ 172.701
Federal vs State Regs.
01-0058



To: Norman Y. Minutia
Secretary of Transportation,
United States Department of
Transportation

Charles D. Nottingham
Commissioner of Transportation,
Virginia Departation of Virginia

From: Otis T. Eanes
Bridge Tunnel Patroller
Moniter Merrimac Memorial Bridge
Tunnel

Date: 08, Feb. 2001

Subject: The Lack of State and/or Federal Rules and Regulations for the State Owned Hampton Roads Area Tunnels

References:

I. Commonwealth of Virginia Rules and Regulations Governing the Transportation of Hazardous through Bridge Tunnel Facilities.

II. Virginia Departation of Transportation State Owned Urban Tunnel Safety Regulation 24 VAC 30-65-10 and 24 VAC 30-65-20

III. Message: D. D. Clark, Assistant Superintendent, June 16, 1999 (Campers and RV)

IV. Message: Perry C. Cogburn, Emergency Operation Office, Oct. 13, 2000 (Propane Regulation)

V. Rules and Regulations Governing the Transportation of Hazardous Materials through the Chesapeake Bay Bridge Tunnel April 24, 2000.

VI. Rules and Regulations Comparison.

VII. Fire Protection and Life Safety for Road Tunnels, Fire Protection, Winter 2000.

As a life time resident of Virginia and a two a half year employee of Virginia Department Of Transportation as a Bridge Tunnel Patroller at the Elizabeth River Tunnel (ERT) and Monitor Merrimac Memorial Bridge Tunnel (MMMBT), and not a disgruntled employee, I feel compel to write this message. I am fifty nine years old and consider myself honored and privileged to work at the MMMBT, which may be the best bridge tunnel facility in the country. The MMMBT and ERT are two of four State Owned Tunnels in the Hampton Roads Area of Virginia that are a vital link in the Interstate 64 System. Prior to this employment, I was honorabled retired as a Federal Employee from the Naval Aviation Depot in Norfolk, Va. after thirty two years of continuous service.

I find that the lack of basic instructions pertaining to the transportation of hazardous materials through these State Owned Tunnel Facilities very surprising. It appears that most information is either unknown, ignored or suppressed. There are no periodical training or shift meetings in regards to the transportation of hazardous materials through these State Owned Tunnels. All emphasis are on customer service. One would think that the main focus would be on the enforcement of the State and/or Federal Rules and Regulations pertaining to the transportation of hazardous materials through these State Owned Tunnels with strong emphasis on customer service .

In an attempt to gain information concerning the transportation of hazardous materials through the State Owned Tunnels, my efforts has been met with confusion, disappointment and frustration. There appears to be very limited basic State and no Federal Rules and Regulations at these facilities governing the transportation of hazardous materials through these tunnels. My inquiries, into these matters, has been answered with very limited printed and verbal instructions. The verbal instructions appear to be various opinionated ideas. The printed instructions (Ref I) is very limited in scope, confusing and fails to indicate the maximum number of Non-Bulk containers per vehicle.

A print of a State Owned Urban Tunnel Safety Regulation (Ref II) pertaining to vehicles using LP gas appeared at the MMMBT this pass Spring. This instruction states that all vehicles using LP Gas for cooking, heating or refrigeration

must stop at the tunnel's inspection station so that the Tunnel Personnel can conduct a manual inspection to verify that the gas containers are turned off, securely attached and determined to be safe for travel. I have no idea where this regulation came from or where to look to research it. Prior to this regulation (Ref II) we were operating on a honor system pertaining to vehicles carrying LP gas (Ref III). This instruction states that when a driver operating a Camper or RV stops for inspection, the Tunnel Patroller will take the driver's word that his LP Gas containers are turned off. To even more wonderment, a message from Perry C. Cogburn dated 10-13-2000 (Ref IV) stated that they were trying to implement a district wide Propane/RV Regulation. It would appear, that if the State Owned Urban Tunnel Safety Regulations (Ref II) is valid, it would need only to be vigorously implemented and enforced.

I have obtained a copy of the rules and regulations governing the transportation of hazardous materials through the Chesapeake Bay Bridge Tunnel from their Internet Web Site (Ref V). It is very specific and references the U.S. Department of Transportation Rules and Regulation pertaining to the many hazardous materials that may or may not pass through that facility. I have not been able to locate the Hampton Roads Area (State Owned) Tunnel Rules and Regulation on the Internet. A comparison of the State Owned Tunnel Limited Regulation (Ref I) to the Chesapeake Bay Tunnel Specific Regulation (Ref V) governing the transportation of Non-Bulk hazardous materials through their facilities reveals a various degree of difference (Ref VI).

Using FLAMMABLE 3 Non-Bulk liquids as a example, the State Owned Tunnel Limited Regulation (Ref I) is very generous with a maximum of 119 gallons per container and apparently no limitation as to the number of these containers per vehicle. Thousands of gallons of highly volatile FLAMMABLE 3 Non-Bulk liquid in a single tractor trailer truck could pass through the State Owned Tunnels as per this instruction. The Chesapeake Bay Tunnel Specific Regulation on FLAMMABLE 3 Non-Bulk liquid, following U.S. Department of Transportation Regulations, has a total not to exceed 120 gallons in 6 gallon containers or less per vehicle. I have been told, by Management, that the Chesapeake Bay Tunnel (Private Owned) and the Hampton Roads Area Tunnels (State Owned) do not have to operate by the same rules and regulation.

A catastrophic fire accident involving a truck carrying thé liberal Non-Bulk hazardous materials in any of the State Owned Tunnels, that approached the magnitude of the tunnel

fires that occurred in Europe in 1999 (Ref VII) would have a profound disastrous effect on commerce and travel in the Hampton Roads Area. Two of these European Tunnel Fires during the first half of 1999 led to 51 fatalities and at least 79 injuries, millons of dollars in damages and rendered the tunnels inoperative for an extended length of time.

In light of these disastrous tunnel fires that occurred in Europe, the liberal hazardous material limits of the State Owned Tunnels should be revisited. A new set of rules and regulations governing the transportation of hazardous materials through the State Owned Tunnels should be initiated using the Chesapeake Bay Tunnel's Rules and Regulations format. A copy of all State and/or Federal Rules and Regulations pertaining to the transportation of hazardous material through the State Owned Tunnels should be readily accessible on each of the Tunnel's Internet Web Site and the Tunnel's Traffic Control Room. A clear and decisive educational program should be initiated and aggressively implemented to inform the tunnel personnel and traveling public about these State and/or Federal Rules and Regulations. Periodic training and certification of the tunnel personnel in regards to these rules and regulations should be required.

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Cc: B. J. Wilkerson
Facility Manager,
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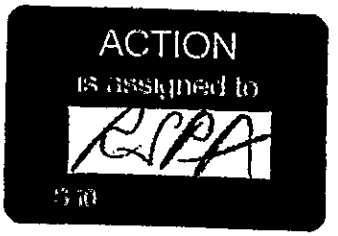

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Cc: B. J. Wilkerson
Facility Manager,
Monitor Merrimac Memorial
Bridge Tunnel

COMMONWEALTH OF VIRGINIA

Virginia Department of Transportation

Rules and Regulations Governing the Transportation of Hazardous Materials through Bridge-Tunnel Facilities

§ 1. Authority.

This regulation is promulgated under the Administrative Process Act (APA) (Chapter 1.1:1, § 9-6.14:1 et seq. of Title 9) of the *Code of Virginia*. Section 33.1-12(3) of the *Code of Virginia* authorizes the Commonwealth Transportation Board to promulgate regulations "for the protection of and covering traffic on and the use of systems of state highways and to add to, amend or repeal the same. The Interstate System is part of the system of the state highways and the Board has additional specific authority under § 33.1-49 to regulate its use." It applies to all bridge-tunnel facilities in the Commonwealth of Virginia, and establishes the rules by which all interstate, intrastate, and public and private transporters of hazardous materials are governed while traveling through these facilities. It becomes effective if approved by the Commonwealth Transportation Board, and if VDOT receives no gubernatorial or legislative objection during the statutory review and post-publication periods required by the APA.

§ 2. List of bridge-tunnel facilities owned by the Commonwealth.

The following table lists the six state owned bridge-tunnel facilities in the Commonwealth. The Virginia Department of Transportation operates all six facilities listed.

Name of Facility	Telephone Number	Route
Big Walker Mountain Tunnel	703-228-5571	Interstate 77
East River Mountain Tunnel	703-928-1994	Interstate 77
Elizabeth River Tunnel-Downtown	804-494-2424	Interstate 264
Elizabeth River Tunnel-Midtown	804-683-8123	Route 58
Hampton Roads Bridge-Tunnel	804-727-4832	Interstate 64
Monitor-Merrimac Memorial Bridge-Tunnel	804-247-2123	Interstate 664

For purposes of this regulation, the facilities listed above are classified into two groups: rural and essentially distanced from bodies of water; and urban and essentially proximate to bodies of water.

§ 3. Restrictions on hazardous material transportation across rural and distanced-from-water facilities.

The two rural and distanced-from-water tunnel facilities are: The Big Walker Mountain Tunnel and The East River Mountain Tunnel. For these two tunnels, and these two only, no restrictions apply on the transport of hazardous materials, so long as transporters and shippers are in compliance with the Code of Federal Regulations, 49, Parts 100 through 180; and any present and future state regulations which may become in force to implement the federal regulations. In addition, the Commonwealth Transportation Commissioner may, at any time, impose emergency or temporary restrictions on the transport of hazardous materials through these facilities, so long as sufficient advanced signage is positioned to allow for a reasonable detour.

Questions on this section of the regulation should be directed to the VDOT Emergency Operations Center at the following telephone number: (804-786-6824). Copies of the regulation will be provided free of charge. For copies, please write to: Virginia Department of Transportation, ATTN: Emergency Operations Center, 1221 East Broad Street, Richmond, Virginia 23219.

§ 4. Restrictions on hazardous material transportation across urban and water-proximate facilities.

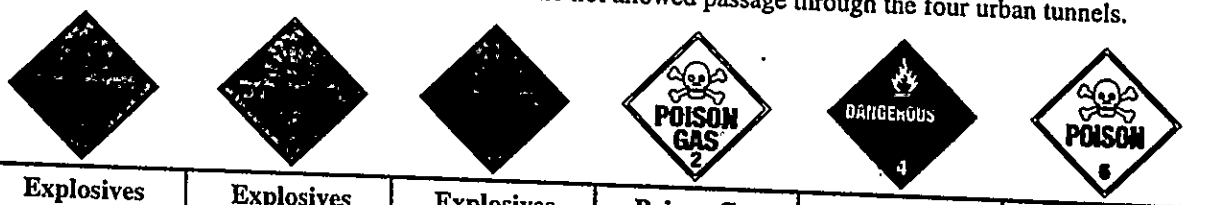
Hazardous materials are regulated in the four urban and water-proximate tunnels (Elizabeth River (Midtown and Downtown), Hampton Roads, and Monitor-Merrimac) based exclusively on the "hazard class" of the material being conveyed. The following tables list those categories of materials grouped under the designations "Prohibited," "No Restrictions," or "Restricted."

**Please contact the Chesapeake Bay Bridge-Tunnel at (804) 331-2960 for information on their regulation.

Rules and Regulations Governing the Transportation of Hazardous Materials through Bridge-Tunnel Facilities

PROHIBITED:

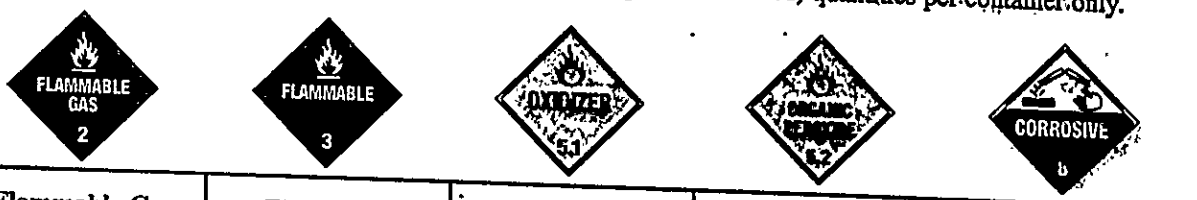
Materials defined in the following hazard classes are not allowed passage through the four urban tunnels.



Explosives 1.1	Explosives 1.2	Explosives 1.3	Poison Gas 2.3	Dangerous When Wet 4.3	Poison (PG I, inhalation hazard only) 6.1

RESTRICTED:

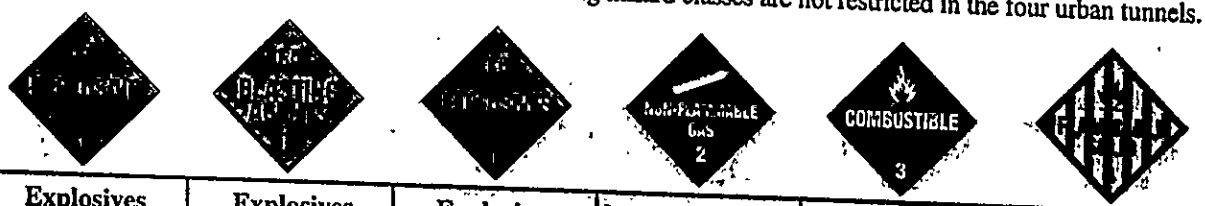
Materials in the following hazard classes are allowed access to the four urban tunnels in "Non-bulk" (maximum capacity of 450 liters/119 gallons or less as a receptacle for liquids, a water capacity of 454 kilograms/1000 pounds or less as a receptacle for gases, and a maximum net mass of 400 kilograms/882 pounds or less and a maximum capacity of 450 liters/119 gallons or less as a receptacle for solids) quantities per container only.



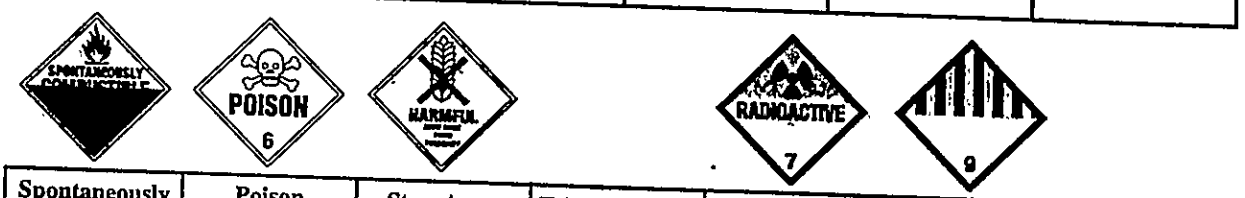
Flammable Gas 2.1	Flammable 3	Oxidizer 5.1	Organic Peroxide 5.2	Corrosive 8

NO RESTRICTIONS:

Materials in the following hazard classes are not restricted in the four urban tunnels.



Explosives 1.4	Explosives 1.5	Explosives 1.6	Non-Flammable Gas 2.2	Combustible Liquid 3	Flammable Solid 4.1



Spontaneously Combustible 4.2	Poison (PG I or II, other than PG I inhalation hazard) 6.1	Stow Away from Foodstuff (PG III) 6.1	Etiologic Agent (no Placard) 6.2	Radioactive 7	Class 9 9	ORM-D (No Placard)

Reference II

Page 1 of 2

VIRGINIA DEPARTMENT OF TRANSPORTATION

STATE-OWNED URBAN TUNNEL SAFETY REGULATION

24 VAC 30-65-10. Applicability of regulation

This regulation applies to vehicles using liquefied petroleum (LP) gas (also known as propane gas) for cooking, heating, refrigeration that travel on the following facilities in the Hampton Roads (formerly Suffolk) Construction District:

Hampton Roads Bridge Tunnel (I-64)

Monitor Merrimac Memorial Bridge Tunnel (I-664)

Elizabeth River Tunnel - Midtown (Rt. 58)

Elizabeth River Tunnel - Downtown (I-264)

24 VAC 30-65-20. Requirements for use of affected transportation facilities

A. Vehicles using liquefied petroleum (LP) gas for cooking, heating, or refrigeration purposes are permitted to use the facilities designated in 24 VAC 30-65-10 provided that the following requirements are met:

1. House trailers, campers, or other recreational vehicles shall not have more than two LP gas containers, having a maximum individual water capacity (WC) of (141) lbs., or (17) gal. (approximately (60) lbs. LP gas capacity). The designation "water capacity" is shown on the valve cover or identification plate, and may be listed in pounds or gallons.
2. LP gas containers must be constructed, installed, and maintained in accordance with 49 CFR Parts 100-180.
3. Vehicles designated in 24 VAC 30-65-20 (A) must stop at inspection stations designated by appropriate signs or markers.

facility personnel must conduct a manual inspection of the LP gas containers to verify that they are valved off, securely attached, and determined to be safe for travel.

5. LP gas container valves must remain closed until the vehicle has cleared the facility.

B. If vehicles designated in 24 VAC 30-65-20 (A) fail to stop for inspection, all traffic shall be stopped at the entrance to the facility until an inspection is conducted, and facility operations determine that the vehicle is safe for travel.

24 VAC 30-65-30. Listing of documents incorporated by reference.

Information pertaining to the availability and cost of any of these publications should be directed to the division indicated, by writing to the Virginia Department of Transportation, 1401 East Broad Street, Richmond, Virginia 23219, or to the address indicated.

1. (24 VAC 30-61-10 et seq.) Rules and Regulations Governing the Transportation of Hazardous Materials Through Bridge-Tunnel Facilities (Maintenance Division)

Ref III

ALL SHIFTS

Petway, Truman BTPS

From: Clark, D. D.
Sent: Wednesday, June 16, 1999 11:20 AM
To: Suffolk MMMBT Traffic Control Supervisors; Suffolk MMMBT Bridge Tunnel Patrol Supervisors; Suffolk MMMBT Traffic Controllers
Cc: Heath, Harold R.
Subject: Campers and RV's

In an effort to provide good customer service and to eliminate questions that may arise about Campers and RV's and checking their gas bottles. When a Camper or RV stops for inspection and the BTP asks if the gas is off and the operator of the Camper or RV states that it is, "We will take his word for it", give him a pamphlet and thank him. Direct any questions to Mr. Heath or myself.

Ref IV

J. E. "Jim" Harrison
Facility Manager HRBT

-----Original Message-----
From: Cogburn, Perry C.
Sent: Friday, October 13, 2000 4:44 PM
To: Nelson, Harold; Heath, Harold R.; Krodel, Debbie
Cc: Wilkerson, Bruce J.; Harrison, Jim E; Mathus, William A
Subject: Propane regulation

On our way to trying to implement a district wide propane/RV regulation we have run into a stumbling blocked named the Department of Planning and Budget. They have requested some information that I do not think we currently possess. If I am wrong please do not hesitate to correct me. They wanted to know how many RV's used the facility and how many who have stopped actually had to turn the propane off. Would you ask the attendants to start keeping track of the number of RV's that had to turn off the valves.

While you are doing that, I have to find out how many tunnels in the United States restrict or check RV's. If you have some questions on this, please let me know.

Perry
804-786-6824

Ref V

Hazardous Materials

RULES AND REGULATIONS GOVERNING THE TRANSPORTATION OF HAZARDOUS MATERIALS THROUGH THE CHESAPEAKE BAY BRIDGE-TUNNEL

PROHIBITED:

Materials defined in the following hazard classes are not allowed passage across the Chesapeake Bay Bridge-Tunnel:

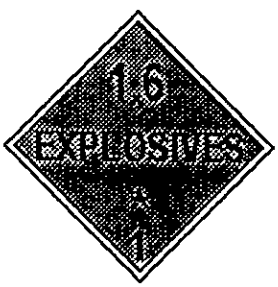
1.1, EXPLOSIVES	1.2, EXPLOSIVES	1.3, EXPLOSIVES

2.3, POISON GAS	4.3, DANGEROUS WHEN WET	6.1, INHALATION HAZARD ONLY

FORBIDDEN MATERIALS

NO RESTRICTIONS:

Materials defined in the following hazard classes are not restricted from crossing the Chesapeake Bay Bridge-Tunnel unless exceptions are noted:



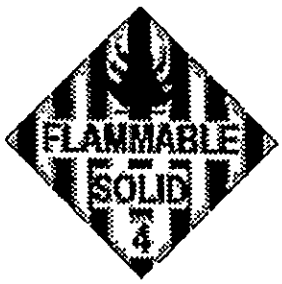
1.4, EXPLOSIVES	1.5, EXPLOSIVES	1.6, EXPLOSIVES

2.2, NONFLAMMABLE COMPRESSED GAS, except for oxygen in tank vehicles, which is prohibited	3, COMBUSTIBLE LIQUID, except formaldehyde solutions which are restricted to 100 gallon containers or less	6.1, POISONOUS MATERIALS (PG 1 OR II, OTHER THAN PG 1 INHALATION HAZARD, AND PG 111, STOW AWAY FROM FOODSTUFF) 6.1 POISONOUS MATERIALS, except inhalation hazards, which are prohibited

6.2, INFECTIOUS SUBSTANCES ORM-D, OTHER REGULATED MATERIALS

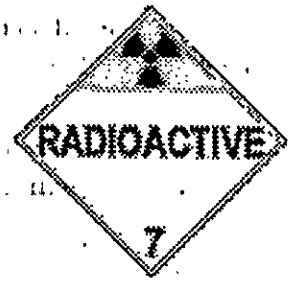
RESTRICTED:

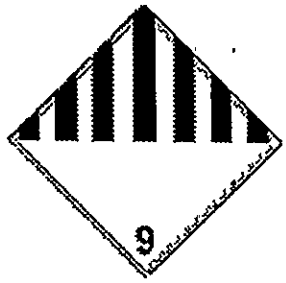
Materials in the following hazard classes are allowed passage across the Chesapeake Bay Bridge-Tunnel with noted restrictions:



2.1 FLAMMABLE GAS - not to exceed 120 gals in 6 gal containers or less except for LPG, which is restricted to two 60 pound cylinders LPG capacity (approx. 141 pounds w.c. each), or any combination of cylinders less than 60 pounds LPG capacity with a total of 120 gals	3, FLAMMABLE LIQUID - not to exceed 120 gals in 6 gal containers or less	4.1, FLAMMABLE SOLID - not to exceed 900 pounds per vehicle

4.2, SPONTANEOUSLY COMBUSTIBLE MATERIALS - not to exceed 900 pounds per vehicle	5.1, OXIDIZER - not to exceed 120 gals in 6 gal containers or less or 900 pounds or less per vehicle	5.2, ORGANIC PEROXIDES - not to exceed 120 gals in 6 gal containers or less or 900 pounds or less per vehicle





7, RADIOACTIVE MATERIALS - not to exceed 300 curies or 500 pounds per vehicle and permission is obtained	8, CORROSIVE MATERIALS - not to exceed 120 gals in 60 gal containers or less or 900 pounds or less	9, MISCELLANEOUS HAZARDOUS MATERIAL - not to exceed 250 gals in 60 gal containers or less or 2000 pounds or less, except oils, N.O.S., with flashpoint not less than 93 deg C/ 200 deg F, which is not restricted

REFERENCE INDEX

1. Definitions

A. The following classes of hazardous materials are defined in the United States Department of Transportation Regulations, 49 CFR 173, which is incorporated by reference:

Name of Class or Division	Class Number	Division Number (if any)	49 CFR Reference for Definitions
(1) Forbidden materials	None	---	---

(2) Explosives (with a mass explosion hazard)	1	1.1	173.50
(3) Explosives (with a projection hazard)	1	1.2	173.50
(4) Explosives (with predominantly a fire hazard)	1	1.3	173.50
(5) Explosives (with no significant blast hazard)	1	1.4	173.50
(6) Very insensitive explosives; blasting agents	1	1.5	173.50
(7) Extremely insensitive detonating substances	1	1.6	173.50
(8) Flammable gas	2	2.1	173.115
(9) Nonflammable compressed gas	2	2.2	173.115
(10) Poisonous gas	2	2.3	173.115
(11) Flammable and combustible liquid	3	—	173.120
(12) Flammable solid	4	4.1	173.124
(13) Spontaneously combustible materials	4	4.2	173.124
(14) Dangerous when wet material	4	4.3	173.124
(15) Oxidizers	5	5.1	173.127
(16) Organic peroxides	5	5.2	173.128
(17) Poisonous materials	6	6.1	173.132

(18) Infectious substances (Etiological agents)	6	6.2	173.134
(19) Radioactive materials	7	—	173.403
(20) Corrosive materials	8	—	173.136
(21) Miscellaneous hazardous materials	9	—	173.140
(22) Other regulated materials: ORM-D	None	—	173.144

B. Terms Defined.

(1) "Container" means a package or receptacle used to contain hazardous materials for transportation, including a box, bottle, can, drum, barrel, cylinder, carboy, or other shipping package, other than a tank vehicle or bulk packaging, used for the transportation of hazardous materials.

(2) "Flash Point" means the minimum temperature at which a substance gives off flammable vapors which in contact with spark or flame will ignite.

(3) "Gross weight" means the total weight of a container and its contents.

(4) "Hazardous material" means a substance or material, including a hazardous substance, which has been determined by the Secretary of Transportation for the United States Department of Transportation (U.S.D.O.T.) to be capable of posing an unreasonable risk to health, safety and property when transported in commerce and which has been so designated.

(5) "Hazardous substance" means a material, including its mixtures and solutions, that is listed in the Appendix to 49 CFR 172.101, which is incorporated by reference. This definition does not apply to petroleum products that are lubricants or fuels.

(6) "N.O.S." means not otherwise specified.

(7) "Net weight" means the weight of the contents of a container only.

(8) "Shipping paper" means a manifest, memorandum receipt, bill of lading, shipping order, or other document describing material to be transported.

(9) "Tank vehicle" means any vehicle with a cargo tank, portable tank, bulk pyramided cylinders, or tube trailer used for the transportation of liquids or gases.

2. General

A. The U.S. Department of Transportation Regulations, 49 CFR 171-177, 397, and any revisions, U.S. Nuclear Regulatory Commission Regulations, 10 CFR 73, and any additional federal regulations affecting the transportation of hazardous materials by motor carriers on highways are incorporated by reference into these regulations.

B. A vehicle loaded with any hazardous material or a tank vehicle which last contained a hazardous material may not be allowed on or in the Chesapeake Bay Bridge-Tunnel District unless it conforms to these regulations and other regulations regarding the use of the Chesapeake Bay Bridge-Tunnel District.

C. Chesapeake Bay Bridge-Tunnel District employees shall have the right to inspect the cargo or shipping papers of any vehicle to ascertain if it complies with all State and federal regulations relating to the transportation of hazardous materials. The inspection may take place at any point where or after the vehicle enters on any District property or its approaches. If hazardous materials cannot be identified by class, or if listed only as N.O.S., or if shipping papers are not available to determine the type of cargo, the vehicle may be prohibited from entering or may be diverted off any District property.

D. For purposes of initiating an inspection under Section C of this regulation, a vehicle displaying the hazardous material identification number 1203 on a "Flammable" placard is presumed to be transporting the hazardous material with the lowest flashpoint which legally can be transported under that identification number.

E. All standards and requirements imposed by the Chesapeake Bay Bridge-Tunnel District which are incorporated by reference, shall be enforced.

F. The Executive Director or the Director of Operations of the Chesapeake Bay Bridge-Tunnel District may waive portions of these Rules and Regulations in unusual circumstances provided safeguards are implemented to protect the facility and traveling public.

3. Alternative-Fuel Vehicles.

A. Alternative-fuel vehicles powered by liquefied petroleum gas (LPG), liquefied natural gas (LNG) or compressed natural gas (CNG) shall be permitted if the:

(1) Vehicle has a:

(a) Dedicated alternative-fuel system installed by the manufacturer of the vehicle; or

(b) Fuel system which has been properly converted to an alternative fuel system.

(2) Vehicle alternative-fuel system conforms to applicable industry standards, including:

(a) NFPA 52 - Standard for Compressed Natural Gas (CNG) Vehicular Fuel Systems, which is incorporated by reference; or

(b) NFPA 58 - Standard for the Storage and Handling of Liquefied Petroleum Gases (LPG), which is incorporated by reference.

(3) Vehicle alternative-fuel system conforms to applicable federal regulations.

(4) Fuel capacity of the vehicle does not exceed 300 pounds water capacity.

B. Alternative-fuel vehicles shall display all markings and symbols required by law or regulation to identify the alternative-fuel system.

4. Tunnel Restrictions.

A. This regulation does not apply to fuel contained in the fuel system of the transporting vehicle, or in the fuel systems of vehicles and equipment being towed or carried.

B. Flames used for heating vehicles or loads shall be extinguished before the vehicle enters the Chesapeake Bay Bridge-Tunnel or its approaches.

C. The following classes of hazardous materials are prohibited from being transported through the Chesapeake Bay Bridge-Tunnel, as indicated:

(1) Forbidden materials are prohibited;

(2) Class 1 explosives, division 1.1, 1.2, and 1.3 are prohibited;

(3) Class 2, division 2.3 poisonous gas, is prohibited;

(4) Class 4, division 4.3 dangerous when wet materials, are prohibited;

(5) Class 6, division 6.1 poisonous materials, if inhalation hazard exists, are prohibited;

D. Tank vehicles which are empty, or which have a residue, or vehicles transporting empty containers are prohibited from entering the Chesapeake Bay Bridge-Tunnel if they previously transported a prohibited hazardous material, with the following exceptions:

(1) Tank vehicles or containers that have been sufficiently cleaned of residue and purged of vapor to remove any potential hazard;

(2) Tank vehicles or containers that have been reloaded with a material not classified as a hazardous material;

(3) Tank vehicles or containers whose previous cargo was:

(a) A Class 3 combustible liquid;

(b) A Class 8 corrosive material;

(c) A Class 5 oxidizer;

(d) A Class 5 organic peroxide; or

(4) Completely empty containers whose previous cargo was a Class 3 flammable liquid.

E. Tank vehicles used to transport Class 3 flammable liquids, even if empty, are prohibited from entering the Chesapeake Bay Bridge-Tunnel.

F. The following classes of hazardous materials are permitted to cross the Chesapeake Bay Bridge-Tunnel, with or without restrictions, as indicated:

(1) Class 1 explosives, division 1.4, 1.5, and 1.6 are permitted;

(2) Class 2, division 2.1 flammable gas is permitted provided quantities do not exceed 120 gallons in 6 gallon containers or less, with exceptions for LPG, which is restricted to two 60 pound cylinders LPG capacity, approximately 141 pounds water capacity each, or any combination of cylinders less than 60 pounds LPG capacity, with a total of 120 pounds LPG capacity;

(3) Class 2, division 2.2 nonflammable compressed gas, is permitted with the exception of oxygen, which is prohibited if in tank vehicles;

(4) Class 3, flammable liquid, having a flash point below 100^0 F, is permitted provided quantities do not exceed 120 gallons in 6 gallon containers or less per vehicle;

(5) Class 3, combustible liquid, having a flash point above 100^0 F, is permitted with the exception of formaldehyde solutions which are restricted to 100 gallon containers or less;

(6) Class 4, division 4.1 flammable solid, is permitted provided quantities do not exceed 900 pounds per vehicle;

(7) Class 4, division 4.2 spontaneously combustible materials, are permitted provided quantities do not exceed 900 pounds per vehicle;

(8) Class 5, division 5.1 oxidizers, are permitted provided quantities do not exceed 120 gallons in 6 gallon containers or less or 900 pounds or less, per vehicle;

(9) Class 5, division 5.2 organic peroxides, are permitted provided quantities do not exceed 120 gallons in 6 gallon containers or less or 900 pounds or less, per vehicle;

(10) Class 6, division 6.1 poisonous materials not marked PG I (Inhalation Hazard), or PG III (Stow Away From Foodstuffs), are permitted;

(11) Class 6, division 6.2 infectious substances, are permitted;

(12) Class 7, radioactive materials, are permitted provided quantities do not exceed 300 curies and the gross weight does not exceed 500 pounds per vehicle and permission is obtained;

(13) Class 8, corrosive materials, are permitted provided quantities do not exceed 120 gallons in 60 gallon containers or less or 900 pounds or less, per vehicle;

(14) Class 9, miscellaneous hazardous materials, are permitted provided quantities do not

exceed 250 gallons in 60 gallon containers or less or 2000 pounds per vehicle, with the exception of oils, N.O.S., with a flashpoint not less than 93°C/200°F, which are not restricted; and

(15) Other regulated materials, ORM-D are permitted.

Last document Revision 11/12/96

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Ref VI

Rules and Regulations Comparison (Limits for Non-Bulk)

Hazardous Materials	Classes	Chesapeake Bay Bridge Tunnel (Ref V)	Hampton Roads Tunnels (Ref I)
Flammable Gas	2.1	120 gallons max per vehicle in 6 gallon containers except LPG 120 gallons max in 60 pounds containers	Water capacity of 454 kg or 1000 lbs per container*
Flammable liquid	3	120 gallons max per vehicle in 6 gallon containers	450 liters / 119 gallons max per containers*
Flammable Solid	4.1	900 lbs per vehicle	None
Spontaneously combustible	4.2	900 lbs per vehicle	None
Oxidizer	5.1	120 gallons max per vehicle in 6 gallon containers or 900 lbs per vehicle	450 liters/ 119 gallons or 400 kg / 882 lbs max per containers*
Organic peroxide	5.2	120 gallons max per vehicle in 6 gallon containers or 900 lbs per vehicle	450 liters/119 gallons or 400 kg / 882 lbs max per containers*
Radioactive	7	300 curies or 500 lbs per vehicle	None
Corrosive	8	120 gallons max per vehicle in 6 gallon containers or 900 lbs per vehicle	450 liters/119 gallons or 400 kg/882 lbs max per containers*
Miscellaneous Hazardous	9	250 gallons max per vehicle in 60 gallon containers or 2000 lbs per vehicle	None

* No limit on the number of containers per vehicle

Reference VII

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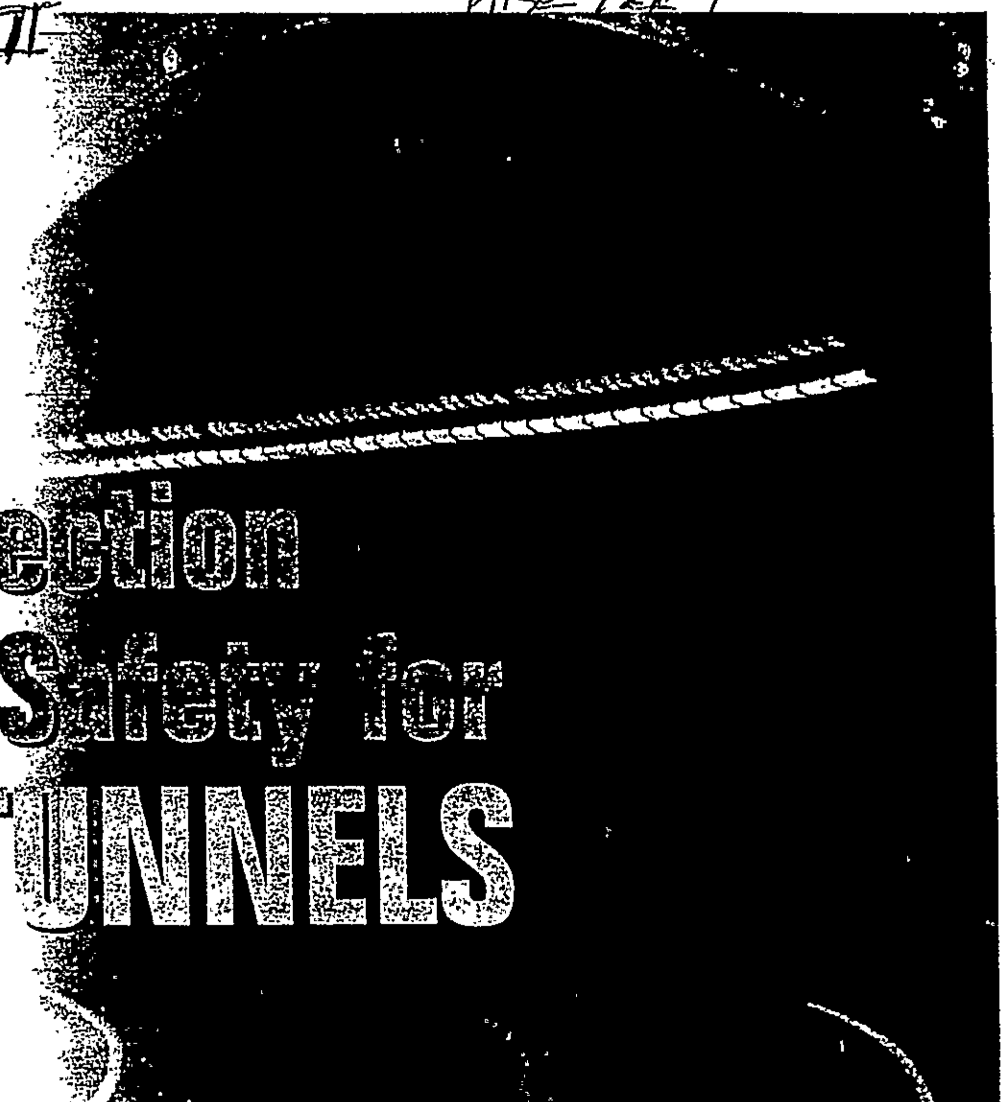

Fire Protection and Life Safety for ROAD TUNNELS

By Christian Dubay

Two major road tunnel fires during the first half of 1999 have led to 51 fatalities and at least 79 injuries. Each of these road tunnel fires was of a magnitude that has not been experienced in decades. These fires have led to a heightened interest in fire protection and life safety for road tunnels. This article will address the basic fundamentals of fire protection and life safety design for road tunnels. Many of the requirements and discussions contained in NFPA 502, Standard for Road Tunnels, Bridges and Other Limited Access Highways, are covered throughout the article. As with any project or design, it is imperative to know our limits as fire protection engineers and to seek the required specialized technical expertise when addressing hazards that do not necessarily correspond to traditional methods or thinking. Many of the traditional methods of fire suppression and ventilation do not hold true in the tunnel environment. Applying suitable methods requires experience and a detailed understa[illegible] principles [illegible]

Recent fires [illegible] Tauren tunnels have [illegible] that tunnel fires can quickly approach magnitudes where suppression is difficult, if not impossible. These fires have highlighted the need for tunnels designed to maximize the fire and life safety while ensuring that when an incident occurs, proper planning and training have been in place. Such items as communication, egress, rescue, coordinated ventilation efforts, extinguishment and system reliability have now moved to the forefront of design, engineering and tunnel operations.

NFPA 502 addresses fire protection requirements for road tunnels based upon the length of the road tunnel. With many short road tunnels [less than 90 m (300 ft)], fire protection and life safety can be accomplished with relative ease by providing motorists with evacuation routes through the tunnel and away from the fire incident. [illegible] length [illegible] ments [illegible] required level of fire protection while ensuring the life safety of the tunnel occupants. For medium-length road tunnels [90 m (300 ft) – 240 m (800 ft)], motorists can be directed to egress away from the fire to the nearest tunnel portal while traffic controls to redirect or stop vehicles and standpipes for fire department use are provided within the tunnel.

Long road tunnels [greater than 240 m (800 ft)] require many design considerations to ensure the life safety of the motorists and the fire protection of the tunnel.[1] The Mont Blanc and Tauren road tunnels, with lengths of 11600 m (38,057 ft) and 6397 m (20,987 ft) respectively, clearly illustrated the dramatic effect long road tunnels can have on fire spread, smoke movement, life safety and fire protection. For example, many of the fatalities at the Mont Blanc fire were found

Major Road Tunnel Fires of the 1900s

Road Tunnel	Date	Fatalities	Injuries	Cause/Problems
Holland, New York 2600 m 8,530 ft	05/13/49	0	66	All cabling and wiring damaged or destroyed during fire. Truck carrying prohibited cargo (carbon disulfide) lost cargo, which ignited upon impact with the road surface.
Nihonzaka, Japan 2042 m 6,700 ft	07/11/79	7	2	Four large trucks and two autos involved in collision where spilled fuel ignited. Fire controlled and extinguished 7 days after initial incident. Of the 231 vehicles and trucks in tunnel during incident, 173 were destroyed. Ceiling, walls and tunnel systems almost completely destroyed for the central 1145 meters of the tunnel.
Caldecott, California 1021 m 3,350 ft	04/07/82	[illegible]	[illegible]	Empty bus attempting to pass [illegible] gasoline tanker truck [illegible] unmarked cross adits/tunnel support systems, lighting, emergency phones, signs, [illegible] severely damaged or destroyed.
Mont Blanc, France 11600 m 38,057 ft	03/24/99	39	30	Truck carrying flour and margarine ignites during passage through tunnel. 35 vehicles destroyed, including 20 trucks. Tunnel ceiling collapses and many of the tunnel systems were destroyed. Estimates predict that the tunnel will be closed for approximately 1 year.
Tauren, Austria 6397 m 20,897 ft	05/29/99	12	49	Truck carrying paint impacts with stopped vehicle resulting in fire and subsequent explosions. 40 vehicles destroyed. Tunnel lining collapses and many of the tunnel systems were damaged or destroyed. Estimates predict that the tunnel will be closed for approximately 5-6 months.

still sitting in their vehicles, not having had time to egress from their vehicles before being overcome. There are several key elements that need to be addressed for all long road tunnel designs and evaluations; these include: fire detection, communications, traffic control, sprinklers, standpipes, water supply, portable fire extinguishers, ventilation, tunnel drainage, control of hazardous materials and cargoes, and emergency response.

DETECTION

Any delay in the discovery of a fire within a road tunnel only increases the magnitude and difficulty of a given incident. Therefore, the detection, verification and location identification of fire within a tunnel are of utmost importance in providing the required protection. NFPA 502 requires at least two means to detect, identify and locate a fire in a tunnel.[1] Often the two methods are manual fire alarm boxes, which are required by NFPA 502, and closed-circuit television systems (CCTV). These two systems provide a means to cover the entire length of the road tunnel while providing visual verification of any reported alarms. Some tunnels have provided methods of heat detection (e.g., linear heat detectors at the tunnel ceiling) to provide further verification of a fire and to assist with the location of the fire and any required actions.

COMMUNICATION SYSTEMS

Communications with the tunnel occupants, tunnel operators and the local fire department are essential to ensure that all interested parties are continually apprised of the fire incident and any required actions. Areas of refuge or assembly within the tunnel should be provided with reliable two-way voice communications to the emergency response authority. These systems will help to verify the magnitude of the incident while providing detailed information on trapped occupants or motorists who have sought protection in areas of refuge. Additionally, radio communication systems, such as highway advisory radio

(HAR) and AM/FM commercial station overrides, can be utilized to provide motorists with information about the emergency and required actions.

TRAFFIC CONTROL

NFPA 502 requires that any tunnel which exceeds 90 m (300 ft) in length must be provided with a means of stopping approaching traffic from entering the tunnel following the activation of the fire alarm within the tunnel.[3] Road tunnels longer than 240 m (800 ft) are required to provide a means to stop traffic from entering the direct approaches to the tunnel, to control traffic within the tunnel and to clear traffic downstream of the fire site following the activation of the fire alarm system within the tunnel.[1] By controlling traffic, the tunnel operators can minimize the number of vehicles and motorists that are exposed to the fire incident.

SPRINKLERS

The use and effectiveness of sprinklers in road tunnels are not universally accepted for many reasons. Currently there is substantial evidence indicating that sprinklers are not only ineffective in controlling the fire but can actually contribute to the spread and severity of the incident.[2]

The Nihonzaka tunnel fire illustrated this point. The steam is often more damaging than the smoke and the sprinklers often had a difficult time in extinguishing hazardous material fires.[2]

Some of the major concerns of tunnel engineers, designers and operating authorities are:[1,2]

- Typical fires are obstructed and very difficult to control with overhead sprinklers.
- Large quantities of superheated steam can spread heat and smoke throughout the length of the tunnel.
- Heat collection is not localized to the fire due to the vigorous ventilation, narrow cross-section and slope of the tunnel.
- Sprinkler activation will severely disrupt the stratification of smoke within the tunnel directly affecting egress from the tunnel.
- Water spray from sprinklers quickly exceeds capabilities of wipers and makes road surface extremely slippery.
- Water sprays from subaqueous tunnels can induce panic due to perceived tunnel failure.

While there are concerns over the effectiveness of sprinkler protection of road tunnels, several tunnels have been equipped with fire sprinklers. Many tunnel applications utilize AFFF (aqueous film-forming foam) in lieu of water-only sprinkler systems to reduce the total required system demand and the total need for drainage and containment of fire suppression discharge. To ensure against accidental discharge, manually operated deluge sprinkler systems should be utilized and zoned to limit the area of discharge to the area of the fire incident.

STANDPIPES

Standpipes for tunnels should be designed and installed as Class I standpipes in accordance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems. Two remotely located fire department connections are required for each independent standpipe system. The locations of the fire department connections should be coordinated with the local Authority Having Jurisdiction (AHJ). Hose connections should be spaced so that no location on the protected roadway is more than 45 m (150 ft) from the hose connection.[1]

WATER SUPPLY

All standpipes and sprinkler systems should be connected to an approved water supply capable of supplying the system demand for a minimum of 1 hour.[1]

PORTABLE FIRE EXTINGUISHERS

Many reported tunnel fires are extinguished or controlled by motorists utilizing portable fire extinguishers provided within the road tunnel.[1] Portable fire extinguishers should be located within wall cabinets at intervals not exceeding 90 m (300 ft). The maximum weight of the extinguishers should not exceed 9 kg (20 lb) to allow for ease of use by motorists within the tunnel. The incorporation of a means of detecting the removal of a fire extinguisher provides an additional method of alarm that can be utilized to alert tunnel operators of a possible fire, while discouraging fire extinguisher theft.[1]

VENTILATION DURING FIRE EMERGENCY

Tunnel ventilation systems are required to be designed to maximize the removal and control of smoke and heated gases that result from fires within the tunnel in order to assist in the evacuation and rescue of motorists. Smoke control can be achieved by removing the smoke from the tunnel (extraction) or by pushing the smoke through the tunnel (control) and out of a tunnel portal. In all cases, the ventilation systems should work to maximize the evacuation and rescue of motorists and to facilitate any fire-fighting operations.[4] The design objectives of the emergency ventilation system are to maintain a stream of noncontaminated air in the path of egress away from the fire and to ensure that longitudinal airflow rates are produced to prevent backlayering of the smoke in the path of egress away from the fire.[4]

In tunnels with bidirectional traffic flow, motorists can be on both sides of a fire incident located within the tunnel. In these tunnels, the smoke stratification should not be disturbed while keeping longitudinal air velocities at low magnitudes. Smoke extraction through ceiling openings or high wall openings should be considered to assist in smoke control. In tunnels with unidirectional traffic flow, motorists are likely to be located upstream of any fire incident within the tunnel. Methods of ventilation for these tunnels include longitudinal systems and transverse or reversible semitransverse systems.[1]

Longitudinal systems for unidirectional tunnels are required to prevent backlayering by producing a longitudinal velocity that is greater than the critical velocity in the direction of traffic flow.

Transverse or reversible semitrans-

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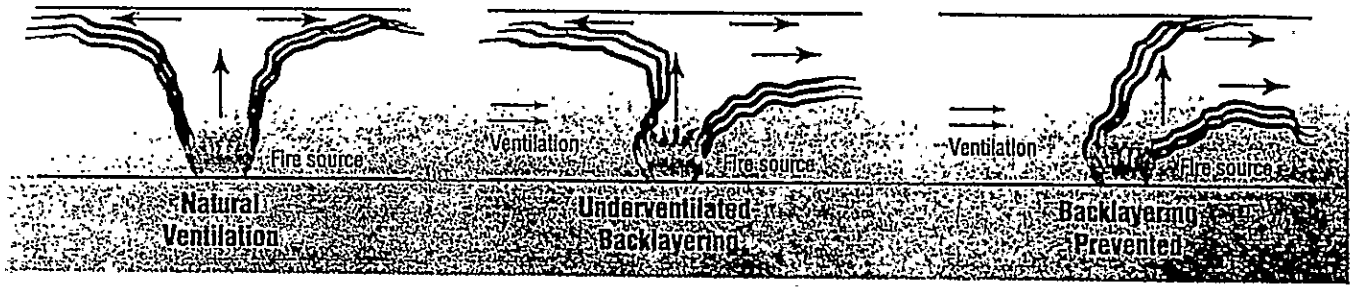

verse systems for unidirectional traffic tunnels are required to maximize the exhaust rate in the ventilation zone where the fire is located and to minimize the amount of air that is introduced by a transverse system. Transverse or reversible semitransverse systems are required to create a longitudinal airflow in the direction of traffic flow by operating the upstream ventilation zones in maximum supply and the downstream ventilation zones in maximum exhaust.

DRAINAGE SYSTEMS

Drainage systems should be installed to collect, store or discharge effluent from the tunnel including cleaning water, seepage, water discharged from fire protection systems and liquids from accidental spills. The drainage system must be designed so that spills of hazardous or flammable liquids cannot propagate along the length of the tunnel and should be designed to be capable of handling the minimum simultaneous discharge from two fire hoses without causing flooding of the roadway.[5]

HAZARDOUS

The control of hazardous materials and hazardous cargoes provides an effective means of reducing the chance of a significant fire scenario. The magnitude and effect of incidents can be increased drastically by the cargoes within the tunnel. These effects were clearly illustrated in the Holland and Caldecott tunnel fires. The operating agency adopts rules and regulations that apply to the transportation of hazardous materials and a program maintained to enforce such regulations. When developing regulations for the control of hazardous materials, the following should be considered:[1]

1. Availability of a suitable alternative route(s) to direct hazardous cargoes around the tunnel.
2. Fire and accident experience with facilities similar to the facility for which rules and regulations are being adopted.
3. Previous fire and accident experience of the facility in question and adjacent roads or, in the case of a new facility, previous fire and accident experience on roads in the area.
4. Anticipated traffic volumes in peak and off-peak periods.
5. Need for inspection of vehicles and cargo and the availability of a safe place to conduct inspections with a minimum of traffic interference.
6. Need and desirability of escort service with due consideration of the extent to which it could disrupt the orderly flow of traffic and create additional hazards.
7. Existing plans developed by an operating agency in a dense urban area and the suitability of such a plan for a given facility should also be considered.

EMERGENCY RESPONSE

Coordination with the local fire department should be conducted from the earliest stages of road tunnel design and analysis. This coordination should include training on road tunnel layout, ventilation, egress routes and emergency notification and response to tunnel incidents. Such systems as an integrated graphic display of the sprinkler system zones, fire detection system zones, tunnel ventilation system limits and emergency access and egress locations provided at the control room can assist tunnel operators and responding emergency personnel to make tactical decisions.[1]

CONCLUSIONS

Ensuring fire protection and life safety in road tunnels is often a very complex and detailed task. In light of the Mont Blanc and Tauren road tunnel fires, fire protection and life safety have moved to the forefront of tunnel design and engineering. Coordination with the fire department from the earliest design stages can work to ensure that all of the required systems are in place to respond to a fire incident in a road tunnel. The use of international standards for road tunnels, such as NFPA 502, and the inclusion of experts in tunnel design and engineering can result in a functional road tunnel that ensures the life safety of the motorists and the fire integrity of the tunnel.

Christian Dubay is with the National Fire Protection Association.

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