SP-20

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

Lag I-84

ISSUED: November 15, 1985

Forwarded to:

Honorable Caspar W. Weinberger
Secretary
U.S. Department of Defense
The Pentagon
Washington, D.C. 20310

SAFETY RECOMMENDATION(S)

I-85-21 through -27

About 4:48 a.m., m.d.t., on August 1, 1984, a tractor-semitrailer combination operated by Riss International Corporation (Riss) of Kansas City, Missouri, was traveling south on Interstate 25 (I-25) in Denver, Colorado. The flatbed semitrailer was loaded with six torpedoes, Class A explosives, which were being shipped from a U.S. Navy base in Keyport, Washington, to a Navy facility in Groton, Connecticut. The driver intended to turn east onto Interstate 70 (I-70) and was being guided by signs when she steered the vehicle to the right onto the ramp connecting I-25 to I-70. The driver then made a quick turn to the left and the trailer whipped. She applied the footbrake, saw that she had to make a left turn at the bottom of the ramp, and then released the brake and tried to steer through the curve. The tractor-semitrailer overturned onto its right side and into the center lane of I-70, slid 62 feet on its side, struck a 48-inch-high concrete safety-shape barrier, bounced off the barrier, and after sliding another 45 feet came to rest. The driver had not seen a left-turn sign and 25-mph advisory speed plate located on the right side of the exit ramp. It was cracked, glazed, and partially hidden from the approaching driver's view by tree foliage and a lamppost. 1/

The circumstance which separates any hazardous materials transportation accident from other accidents is the immediate need for specialized information, expertise, and equipment. No matter how extensive the Federal or State response network may be, it always will be the local emergency response network that must deal initially with the uncertainties of the threat. Local emergency personnel must be able to assess quickly the threat posed to public safety by the materials involved, to acquire the appropriate resources to mitigate the threat, and to have confidence in the information being received and in the ability of those who have a responsibility to assist throughout the emergency. Furthermore, local emergency response personnel perceive military explosive shipments as different qualitatively and quantitatively than civilian shipments, which influences action they take to identify the hazards presented by the cargo and to mitigate the threats.

1/ For more detailed information read Hazardous Materials Accident Report--"Overturn of a Tractor-Semitrailer Transporting Torpedoes, Denver, Colorado, August 1, 1984" (NTSB/HZM-85/02).

In this accident, the local emergency response organizations were unable to obtain authoritative information and expertise on the threat posed to the community in a timely manner. When emergency response personnel called the U.S. Department of Defense (DOD) at two telephone numbers listed on the shipping paper, about 5:15 a.m., neither telephone was answered. (Subsequent to the accident, the DOD directed that 24-hour telephone numbers be entered on shipping documents.) The Denver Fire Department (DFD) was also unsuccessful in contacting the Rocky Mountain Arsenal, a local U.S. Army installation, and the motor carrier. The DFD called the Lowry Air Force Base (AFB) command post, located in Denver about 8 miles from the accident site, and reported the accident; no specific help was requested. The Lowry AFB made no notification to any other military organization or facility at that time. Therefore, the DFD called the Chemical Transportation Emergency Center (CHEMTREC) of the Chemical Manufacturers Association, was connected telephonically to the Naval Sea Systems Command in Washington, D.C., and a DOD emergency response was initiated. The Army directed the 94th Ordnance Detachment from Fort Carson, Colorado, about 70 miles south of Denver, to respond and give explosive ordnance disposal (EOD) assistance.

Although the 94th Ordnance Detachment advised the Rocky Mountain Arsenal, which had been called later by local authorities, not to respond because military regulations assigned that responsibility to the detachment, the Rocky Mountain Arsenal continued preparations to respond. About 7:15 a.m. (about 2 hours 27 minutes after the accident), the Rocky Mountain Arsenal's Technical Escort Unit arrived at the accident site. The unit commander informed the DFD that he did not have jurisdiction to conduct emergency response activities but would offer advice and assistance. The commander examined the site to determine if there was any immediate hazard; he did not see any.

At 9:06 a.m., the 94th Ordnance Detachment arrived at the accident site by helicopter and examined the shipment. The vehicles and cargo were uprighted by 11:45 a.m., the torpedo containers were centered and secured by about 12:22 p.m., and about 12:40 p.m., a wrecker began towing the tractor, semitrailer, and cargo to the Rocky Mountain Arsenal. The I-70/I-25 interchange was opened to traffic at 1:12 p.m., about 8 hours after the accident.

An eight-man response team from the Keyport base left Seattle-Tacoma International Airport about 1 p.m. and arrived in Denver about 2:15 p.m., 1 1/2 hours after the torpedoes had been moved. A Naval Underwater Systems Center technical team left Newport, Rhode Island, about 10 a.m., and arrived in Denver about 3:30 p.m., about 2 1/2 hours after the torpedoes had been moved.

Military munitions often contain hazardous materials that may be unique to the DOD, and information about the hazards of those materials is not available to local emergency response personnel from commonly accessible sources. A fluid leak initially thought to be from one of the torpedo containers was originally reported to be Otto Fuel II, which contributed to the delay in uprighting the vehicle and the frustrations of emergency response personnel who received varying reports on its hazard. The "Special Instructions For Motor Vehicle Drivers," furnished by the DOD with the shipment, provided no specific information on Otto Fuel II.

The "Special Instructions For Motor Vehicle Drivers" warned firefighters to not approach closer than 1,200 feet and that the public should not approach closer than 2,000 feet when there is a fire. The U.S. Department of Transportation (DOT) emergency response guide recommends a minimum evacuation distance of 2,500 feet for Class A explosives, and Navy officials later estimated a mass detonation of all six torpedoes

probably would have propelled fragments 4,500 feet. It is imperative that information provided on the special instructions which accompany shipments inform responders about the hazards of the specific materials transported, and that the evacuation distances be clearly specified to reflect the actual threats of the materials shipped.

The DOD response to the accident was fragmented, slow, and confusing to onscene civilian emergency response personnel. There was no clear understanding within the Navy and the DOD as to the proper and effective method of emergency response to the accident. At no time was one military office clearly the central point of contact for information or response assistance. At least seven DOD organizations either were requesting information from the scene, providing information, or both. Information provided to onscene emergency response personnel was not coordinated through a DOD focal point, and sometimes in an attempt to provide as much information as possible, some information not specific to the accident conditions or environment was provided, i.e., if Otto Fuel II burned it would produce cyanide gas--a circumstance pertinent only in an enclosed environment. Because the Lowry AFB command post failed to notify either the Navy (shipper) or the nearest EOD military facility (the Army's Fort Carson) after it was notified by the DFD 35 minutes after the accident occurred, it delayed the initiation of a military response. The DOD should ensure that all of its military bases understand the responsibilities assigned to them by interservice regulations to notify the responsible service upon the receipt of information of an EOD incident involving explosive ordnance of another service or Federal agency. Onscene response times by the Rocky Mountain Arsenal's Technical Escort Unit and Fort Carson's 94th Ordnance Detachment appear to have been reasonable, once they were notified. Fort Carson's response time could have been improved had a complete library of all military munitions publications been available. Fort Carson did not have publications for munitions unique to other military departments, and personnel from the 94th Ordnance Detachment had not received extensive training in underwater weapons. Since the accident, the DOD has begun furnishing all military EOD units with all munitions publications, and a Navy postaccident report 2/ has recommended additional cross-service training. The Navy understands the interservice regulations to assign it operational EOD responsibility to render safe and dispose of underwater ordnance; however, an onscene response time of 9 hours is totally inadequate. Navy EOD and Otto Fuel II response teams were not even directed to respond to the accident site until 2 1/2 hours after the accident. It then took another 7 hours to arrive at the accident site.

Launching the Fort Carson EOD team was appropriate, but it arrived more than 4 hours after the accident. The nearest military EOD units may be hundreds of miles from locations where accidents occur; therefore, the DOD also should use the capabilities of military resources, such as the Rocky Mountain Arsenal's Technical Escort Unit, that have explosive ordnance training to initially assess the damage that explosive shipments may have incurred and the potential hazards presented. The DOD failed to use fully the onscene expertise of the Rocky Mountain Arsenal which had arrived on the accident scene almost 2 hours before the Fort Carson EOD team. It was only on the initiative of the officer-in-charge that the unit provided civilian authorities their first reasonably authoritative information on the potential hazards.

2/ "Command Inquiry Into an Accident on 1 August 1984 Near Denver, Colorado Involving a Truck Carrying MK 48 Torpedoes," October 3, 1984, Captain Lowell J. Holloway, USN, endorsement by Chief of Naval Operations, U.S. Navy.

Public exposure to DOD explosive shipments has increased steadily from 23,456 shipments in 1980 to 44,996 shipments in 1984. Highway accidents involving those shipments also have increased--from 3 in 1980 to 7 in 1984. The risk is not confined to a small geographic area; between 1980 and 1984, the Military Traffic Management Command (MTMC) reported 27 highway accidents involving DOD explosive shipments in 18 States. Therefore, it is imperative that the DOD establish clear procedures and responsibilities to ensure a prompt and coordinated emergency response to accidents involving explosive shipments, and that it provide a capability for local emergency response personnel to communicate quickly with knowledgeable personnel. When planning emergency response procedures for transportation accidents, it is imperative that the DOD take into consideration local emergency response personnel perceptions about unique, complicated DOD weapons, i.e., torpedoes and missiles, and that prompt assistance will be required by the local authorities.

These circumstances require that adequate first-responder information be carried with military explosive shipments, and that adequate information be available immediately through well-publicized and effective 24-hour communication links. Knowledgeable personnel must be available to provide specific information about the hazards of the shipments. As a minimum, the DOD should consider the use of CHEMTREC, the DOT's National Response Center, or a single toll-free DOD telephone number entered on shipping papers in addition to shipper and receiver telephone numbers. Finally, DOD specialized resources must be ready to respond to render onscene assistance promptly. The Navy's postaccident report and a DOD postaccident report 3/ were reviewed by the Safety Board and found to be objective in identifying deficiencies in the DOD response. The DOD should carefully evaluate the reports and adopt the recommended changes DOD-wide so as to improve the safe transportation of all DOD explosive shipments and to improve DOD response to accidents involving those shipments.

In March 1984, the driver and her brother (the codriver of the accident vehicle) enrolled in the Professional Driving Academy (PDA) in Kansas City, Kansas; both graduated from the academy on May 11, 1984. The driver started driving for Riss on May 14, 1984. She had no previous truckdriving experience. To the time of the accident the driver had accumulated a total of 8,227 miles driving for Riss, of which 3,659 miles involved the transportation of Class A and B explosives.

After 4 weeks of the 7-week truckdriving school, the driver's instructor reported that she still did not read traffic conditions well and make adjustments promptly while driving a tractor-semitrailer, i.e., she waited too long to begin slowing down. The codriver recognized her limited experience and specifically drove from Rawlins, Wyoming, to Fort Collins, Colorado, so that the driver would operate the truck on a highway with fewer curves. Her lack of truckdriving experience contributed to her failure to recognize the hazards at the interchange ramp for the vehicle she was operating, and to her failure to slow the vehicle sufficiently to safely negotiate the curve at the end of the ramp.

While in this accident driver inexperience was the major factor, other factors must be considered in the selection of drivers. In an accident involving a tractor-semitrailer loaded with Class A explosives, on April 9, 1984, near Farewell Bend, Oregon, the driver failed to control the vehicle while negotiating a steep grade and curve. The vehicle

3/ "DOD Report on Motor Vehicle Accident Involving Transport of Navy MK 48 Mod 4 Torpedoes, Denver, Colorado, 1 August 1984," Peter J. Rutledge, November 20, 1984, revised December 6, 1984.

traveled through the air for 84 feet before landing upside-down. According to the Bureau of Motor Carrier Safety (BMCS) accident investigation, the driver held chauffeur licenses from two States, and discrepancies were disclosed between his employment application and information provided by previous employers. For example, his employment application stated that he had driven for a trucking company for 18 months; the BMCS accident investigation disclosed that he had worked there only 28 days and was terminated after his involvement in a major truck accident. The codriver was on his first interstate trip after completing a "truck-trailer instruction course" from a truckdriving school on April 2, 1984, only 7 days before the accident. The codriver in that case had been convicted previously of driving while intoxicated and speeding which resulted in his license being revoked for 1 year. While his license was revoked, he was convicted of careless and imprudent driving and his license was revoked for another year. After his license was reinstated, he was convicted of speeding.

Additionally, the Safety Board investigated an accident on December 2, 1982, involving a tractor-semitrailer loaded with 18 surface-to-air missiles near Los Banos, California. The truckdriver admitted to drinking alcoholic beverages prior to the accident, and he pleaded guilty to a charge of "reckless driving with alcohol involvement." He had been convicted of 14 previous traffic violations--9 for speeding, 1 for driving while intoxicated, 1 for reckless driving, 1 for fleeing a police officer, 1 for running a red light, and 1 for having a fictitious license. In June 1976, the driver was convicted of one count of burglary and two counts of theft of property. He was 17 years old at the time. He was later convicted of public intoxication, possession of a firearm, minor in possession of beer, theft of gasoline, and consuming alcohol after hours. At the time of the accident, robbery charges were pending. Following the accident the MTMC amended carrier agreements to prohibit carriers transporting Class A or B explosives from using drivers with "a record of criminal violation or other incident of unsafe driving including driving while intoxicated (DWI)." However, following motor carrier objections, the restriction was substantially relaxed to prohibit only the use of a driver disqualified in accordance with DOT regulations (49 CFR 391.15).

On December 31, 1984, the DOD petitioned the DOT's Federal Highway Administration (FHWA) to amend the driver qualification regulations to require that a driver attain at least 12 months' experience operating motor vehicle equipment of a similar type (such as a tractor-semitrailer) before being qualified to transport Class A or B explosives and Class A or B poisons. The DOD requested this action to ensure that each motor vehicle operator gained experience with lower risk cargo before being allowed to transport explosives or poisons, and that the proposed requirement should be further considered for all hazardous materials. While the Safety Board believes that this would be beneficial, DOT's driver qualification requirements are only minimum safety standards. The DOD, as well as other shippers of hazardous materials, can and should require higher safety standards commensurate with the risk of the material they are shipping. Therefore, the Board sees no reason that the DOD should not require motor carriers transporting its munitions and other high-hazard shipments to meet safety requirements that the DOD has determined are necessary for the safe transportation of those materials.

The DOD requires its shipping facilities to perform safety inspections of motor carrier equipment before tendering explosive shipments, but it relies primarily upon the Interstate Commerce Commission (ICC) and the BMCS of the FHWA to determine if carriers meet minimum Federal safety standards. However, the BMCS safety audits and safety ratings have been criticized by the Congress and the General Accounting Office (GAO), and the DOD appears to be unaware of those deficiencies. The GAO found that

the BMCS "has changed a carrier's conditional or unsatisfactory rating based on the carrier's sending a letter to the BMCS explaining correction of violations and improved compliance. The changes in overall ratings were made without audit verification," and the GAO reported to the Congress that changing carrier safety ratings without an audit has a possible impact in carrier audit selection, ICC modifications in licensing authority, and the use of ratings by insurers and shippers selecting carriers to transport goods. The GAO reported that it conducted an audit of the BMCS in 1977 and that the report had similar findings. The GAO concluded that conditions in 1984 are worse than in 1977 because of an increased number of carriers subject to audit and greater inconsistencies.

During the investigation of this accident, Safety Board investigators identified an instance in which BMCS headquarters changed the safety rating of a motor carrier without audit verification to determine if there was improved regulatory compliance. The carrier was the first carrier called by the Navy to transport the torpedoes that were involved in the accident; however, it was not able to furnish equipment for this load. On October 24, 1984, a BMCS field office (Office of Motor Carrier Safety) conducted an audit on the foregoing carrier. The field staff auditor assigned a "conditional" rating and noted that the president of the carrier "would not commit himself to any changes he would make to effect compliance." Subsequently, on November 19, 1984, the BMCS headquarters assigned a "conditional" rating. On November 26, 1984, the carrier's safety director wrote to the BMCS field office and appealed the "conditional" rating noting that "As a result of this rating, we have been restricted from transporting Department of Defense shipments." On December 7, 1984, the carrier submitted to the BMCS field office a summary report of corrective actions made since the audit, and again appealed the "conditional" rating. On December 10, 1984, the field officer-in-charge met with the carrier's safety director and recommended to the regional office that the carrier's rating be changed to "satisfactory." The carrier was not reaudited, but explained actions taken to increase compliance. On December 11, 1984, the safety rating was changed to "satisfactory," and the MTMC was advised of the improved rating.

The DOD's position that it needs no program for monitoring the safety of its hazardous materials shipments in transportation because it relies upon the ICC and the DOT to enforce safety requirements is unrealistic. Major deficiencies in the BMCS carrier safety audits and safety ratings have been identified by the Congress and the GAO since 1977. Furthermore, the BMCS has assigned safety ratings only to 15.1 percent of the 212,413 carriers of which it has a record and a "satisfactory" safety rating only to 11.9 percent. In addition to these limitations, the BMCS has only 138 inspectors dedicated to the enforcement of the safety standards--standards which the DOT acknowledges are minimum safety standards. Finally, the ICC's "safety fitness determinations" are dependent upon data furnished by the BMCS relative to the safety record of carriers seeking ICC approval. Accordingly, the DOD is relying on essentially illusory programs to ensure the safety of its shipments.

Partly in recognition of this problem, the Chemical Manufacturers Association, the American Trucking Associations, Inc., and the National Tank Truck Carriers, Inc., have sponsored a voluntary safety survey program designed to help hazardous materials shippers evaluate motor carrier safety programs. The voluntary program asks carriers to complete a survey form and to authorize the shipper to physically inspect carrier facilities to confirm the information provided. Motor carriers that refuse to participate in the safety survey program, or that fail to improve operations to meet the shipper's standards, have been denied hazardous materials freight by the inquiring shippers.

During 1984, the DOD approved 94 carriers to transport 44,996 shipments of explosives; many hundreds of other hazardous materials shipments were made, including specialty products exclusively used by the DOD. The 1984 explosive shipments represent a 100-percent increase over the 1980 statistics, and the number of annual shipments still is increasing. Beyond its own interests the DOD has a responsibility as a shipper of high-hazard materials to ensure that the transportation of those materials does not expose the public to unnecessary risk. Like other large shippers of hazardous materials, the DOD needs to identify the safety requirements necessary for ensuring reasonable public safety based on the hazards presented by its shipments and then require carriers to meet these more stringent safety requirements. For example, the DOD already has identified the necessity for higher qualifications for drivers used in the transportation of its explosive shipments and has petitioned the DOT to modify the Federal requirements; however, administrative action could be taken immediately by the DOD regarding its shipments. Additionally, the DOD needs to establish specific standards on driver prerequisites regarding experience, substance abuse, and a proven record for safe driving; on requirements for safe havens suitable for the security and safety of its shipments; on specific routing requirements; and on other conditions necessary for safely transporting its shipments. Furthermore, the DOD should establish a safety evaluation program to monitor motor carrier compliance with these safety requirements, and to deny to those that fail to comply the transportation of further DOD shipments. Such a program would complement the DOD's service performance program now in effect and provide assurance that the carriers it uses provide the quality of service desired consistent with the needs for public safety.

The critical rollover speed for the tractor and loaded semitrailer was calculated to be about 42 mph. A greater margin of safety (3- to 5-mph higher critical overturn speed) could have been attained by lowering the center of gravity of the load--distributing the torpedoes over more of the trailer, using a lower trailer, or a combination of both. If the torpedoes had been loaded in a single layer instead of stacked two high, the center of gravity for the torpedoes would have been lowered from 33 inches to 15.9 inches above the bed of the semitrailer, increasing the calculated rollover speed to about 45 mph. Using a commercially available low-bed trailer and stacking the torpedoes two high, the calculated overturn speed would be about 47 mph. Specially constructed low-bed trailers would provide an even higher calculated rollover speed of the vehicle, which would help drivers to recover after making an error in judgment. However, a lower trailer also would increase the risk of penetration into the load during rear-end or side-impact collisions with other vehicles, and the use of a low-bed trailer should be evaluated for each type of shipment.

Therefore, the National Transportation Safety Board recommends that the U.S. Department of Defense:

> Establish an effective 24-hour communication system to provide local emergency response personnel immediate access to authoritative information and expertise on the threats presented by explosive and other high-hazard Department of Defense shipments involved in transportation accidents. (Class II, Priority Action) (I-85-21)
>
> Amend emergency response procedures to provide to local emergency response personnel prompt, coordinated, onscene emergency response assistance in accidents involving the transportation of explosive and other high-hazard Department of Defense shipments. (Class II, Priority Action) (I-85-22)

Amend the "Special Instructions For Motor Vehicle Drivers" which accompany explosive and other high-hazard Department of Defense shipments to provide local emergency response personnel comprehensive shipment-specific hazard information and shipment-specific precautionary actions, including appropriate evacuation distances. (Class II, Priority Action) (I-85-23)

Provide pertinent cross-service training and technical reference materials to Department of Defense personnel responsible for providing onscene emergency response assistance in accidents involving the transportation of explosive and other high-hazard Department of Defense shipments. (Class II, Priority Action) (I-85-24)

Establish Department of Defense safety requirements for the safe transportation of explosive and other high-hazard Department of Defense shipments which motor carriers must meet, in addition to U.S. Department of Transportation requirements. (Class II, Priority Action) (I-85-25)

Establish a safety evaluation program to monitor motor carrier compliance with Department of Defense safety requirements for explosive and other high-hazard Department of Defense shipments. (Class II, Priority Action) (I-85-26)

Revise loading specifications for explosive and other high-hazard Department of Defense shipments to provide the lowest possible center of gravity consistent with the protection which must be afforded the shipment. (Class II, Priority Action) (I-85-27)

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility ". . . to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendation I-85-21 through -27 in your response.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in these recommendations.

By: Jim Burnett
Chairman