Petroleum Storage & Transportation Capacities

Volume IV • Tank Cars/Trucks

National Petroleum Council • December 1979

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Committee on U.S. Petroleum Inventories, and Storage and Transportation Capacities
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The National Petroleum Council is a federal advisory committee to the Secretary of Energy.

The sole purpose of the National Petroleum Council is to advise, inform, and make recommendations to the Secretary of Energy on any matter requested by the Secretary relating to petroleum or the petroleum industry.

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INTRODUCTION AND EXECUTIVE SUMMARY

INTRODUCTION

In June 1978, the Secretary of Energy requested the National Petroleum Council to determine the nation's petroleum and gas storage and transportation capacities as part of the federal government's overall review of emergency preparedness planning (Appendix A). The National Petroleum Council has provided similar studies at the request of the federal government since 1948, most recently the 1967 report entitled U.S. Petroleum and Gas Transportation Capacities and the 1974 report entitled Petroleum Storage Capacity.

To respond to the Secretary's request, the National Petroleum Council established the Committee on U.S. Petroleum Inventories, and Storage and Transportation Capacities, chaired by Robert V. Sellers, Chairman of the Board, Cities Service Company. A Coordinating Subcommittee and five task groups were formed to assist the Committee (Appendix B).

The Tank Cars/Trucks Task Group, chaired by Walter B. Smith, Jr., Manager, Traffic - U.S., Petroleum Products Department, Texaco Inc., was requested by the Committee to:

- Provide a demographic breakdown and a geographic analysis of the U.S. rail tank car fleet
- Determine the number of tank vehicles, with a capacity in excess of 3,500 gallons, which might be called upon to safely haul petroleum products (including LPG and LNG) in the event of a national emergency.

The Association of American Railroads (AAR) provided the data for the demographic analysis of the U.S. rail tank car fleet. The AAR maintains a record of the U.S. railcar fleet in its Universal Machine Language Equipment Register (UMLER) computer file.

The geographic breakdown of the shipment origin locations of the U.S. tank car fleet was adapted from the Interstate Commerce Commission (ICC) One Percent Waybill Sample.

To develop the tank vehicle data, the National Petroleum Council surveyed the memberships of the following trade associations, which were considered to include most of the companies which use tank vehicles to haul petroleum:

- American Petroleum Institute (Central Committee on Highway Transportation) (API)
- Chemical Manufacturers Association (CMA)
- National Oil Jobbers Council (NOJC)

- National Council of Farmer Cooperatives (NCFC)
- National Tank Truck Carriers (NTTC).

The survey results were extrapolated to develop the estimate of the total number of U.S. tank vehicles available to haul petroleum products in an emergency.

EXECUTIVE SUMMARY

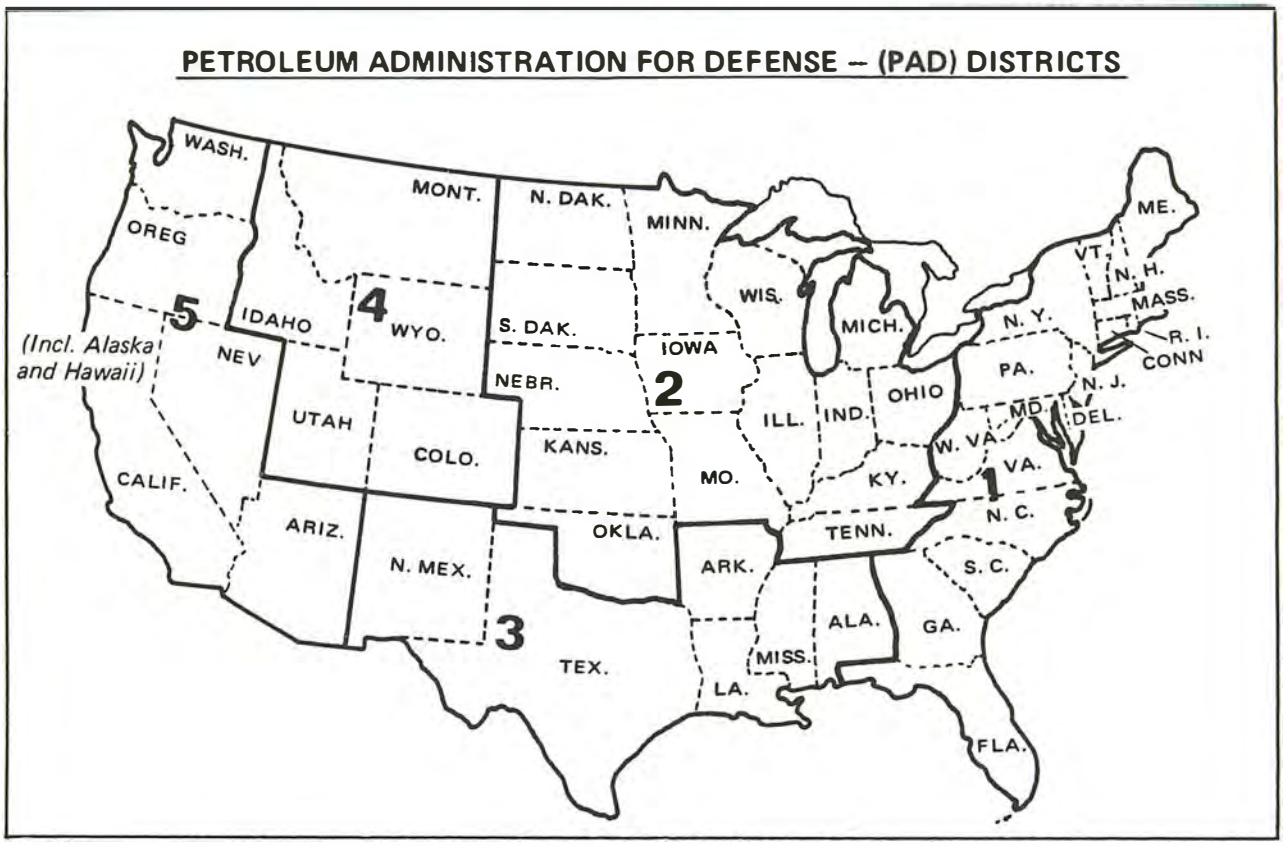
Tank Cars

As of June 15, 1979, there were 202,811 tank cars, representing a 3.6 billion gallon capacity, in the U.S. rail car fleet. Of that total, 107,552 tank cars (2.2 billion gallon capacity) are considered to be suitable for carrying crude oil and petroleum products. These suitable cars reflect a 28 percent increase in gallonage but a 24 percent decrease in actual car count since the 1967 National Petroleum Council study, indicating a trend of replacing older, smaller equipment with larger capacity cars. A significant number of additional cars could be used in at least limited service, depending upon the severity of the emergency and the availability of an adequate amount of time for car conversion work.

The number of cars suitable for the transportation of crude oil and petroleum products in an energy emergency is a subjective matter which would no doubt be dependent upon the severity of the emergency in question. This report takes a more conservative view in this respect than the 1967 National Petroleum Council study which reflected 20 percent non-suitable cars versus 45 percent reported in 1979.

Tank cars are designed to carry a large number of specialty products. Although they are flexible enough to be transferred into an alternate petroleum-based service, the cost of making them again suitable for their originally intended service would have to be measured in terms of the severity of the emergency. In addition to cost, a factor to be considered is that a large number of these other products would have to continue moving, even in a national energy emergency, if the economy were to continue operating. Moreover, a significant number of these commodities are more dependent on rail transportation than is petroleum. It should also be noted that there are a significant number of "general purpose" cars included in the suitable classification, which, according to the severity of the crisis, would remain in their current service for the reasons noted above. In an emergency, the federal government must take into consideration the varying priorities involved.

A geographic analysis of tank car locations, based upon the ICC One Percent Waybill Sample of the origin points of tank car movements, indicates a high concentration of tank cars in Petroleum Administration for Defense (PAD) districts I, II, and III.



This study was intentionally limited to the use of available computer tabulated data sources, which are being continually updated. As a result, the information in this report can be readily updated if the need arises. This ready availability of data is crucial to successful emergency preparedness planning and program implementation.

Tank Trucks

It is estimated that, as of December 31, 1978, there were over 50,000 tank vehicles in the United States, each with a capacity of over 3,500 gallons, and a total capacity of about 364 million gallons. Although these tank vehicles were not all designed primarily for petroleum service, they could nonetheless be used to haul petroleum in an emergency.

The 1967 National Petroleum Council report estimated the number of suitable tank vehicles with a capacity of over 2,000 gallons, while this report is limited to vehicles hauling over 3,500 gallons. The greater capacity is considered to be more valid for the purposes of this report. In time of emergency the smaller vehicles would most likely remain in local service, while the larger vehicles would be used to transport petroleum over long distances to respond to supply disruptions.

A geographic analysis of tank vehicle locations reflects that the vast majority of the vehicles are domiciled in PADs I and II.

The increased operating efficiency of the tank truck industry, since the 1967 National Petroleum Council study, has resulted in a decrease in the number of vehicles required to be in service. The single most important factor in this greater efficiency is the implementation of 24-hour loading and unloading, which permits increased utilization of individual units.

Of significance as well is the impact of the Federal-Aid Highway Amendments of 1974 (PL-93643), which permitted states to increase vehicle size and lessen weight restrictions. As a result of this legislation, gross loads have increased from the pre-1974 nominal limit of 73,280 pounds to 80,000 pounds in most states.

Rules promulgated by the Environmental Protection Agency have a growing and profound impact on the tank truck industry. Water treatment and waste disposal facilities are becoming more sophisticated and costly. Examination of the impact on the industry of various tank cleaning methods was beyond the scope of this study; however, the subject warrants further research.

INDUSTRY OVERVIEW

TANK CARS

The tank car movement is unique in that it can deliver small volumes of product (8,000 to 34,000 gallons) in single cars, and, when economically feasible, smaller quantities if the car is compartmented. Conversely, the unit train concept (i.e., a number of connected tank cars) allows large volumes of product to be carried, creating, in effect, a "mini-pipeline on wheels." It is possible to load all cars through one intake valve and unload through a single valve as well.

Tank car movement is limited, of course, to service where tracks are available, thereby limiting its delivery capabilities. In this regard, tank cars are less flexible than trucks, but more flexible than either pipelines or water shipments, as tank cars can interchange throughout the U.S. railroad system.

Considering distances shipped, the tank car is generally less economical for hauling petroleum than are pipelines and tankers, but more economical than truck movements. Similarly, because of the volumes required to supply many customers, the logistics of unloading trucks would favor the greater carrying capacities of pipelines, tankers, and unit trains, if available. Likewise, truck unloading would not be feasible in many cases because of the large number of units required, thereby favoring tank cars which can carry quantities four to five times greater than tank trucks.

Government agencies and industry organizations regulate and review tank car design and operations with respect to equipment design, compliance with local, state, and federal laws, and compatibility of tank cars with other cars in the train.

The Department of Transportation (DOT) was created by an act of Congress in 1966. It now conducts a broad rail safety regulations program, including functions formerly administered by the Interstate Commerce Commission (ICC). The ICC, an independent federal regulatory agency, was created by Congress in 1887 to regulate rail rates and service, and now controls these matters for all common carrier surface transportation.

Through the Federal Railroad Administration (FRA), the DOT regulates rail transportation safety in general. The regulation program includes mandatory periodic safety inspections of most tank car components. Through its Office of Hazardous Materials Operations (OHMO), the DOT's Materials Transportation Bureau performs the coordinating function of rule-making. Its rules define those commodities subject to DOT regulations and cover commodity packaging in interstate transportation. For example, DOT regulation No. HM 144 - Retrofit - Hazardous Materials Regulations for Pressure Tank Cars (Title 49 CFR - DOT) required the retrofitting of approximately 22,000 pressure tank cars. This process included the

insulation of the outer shell of tank cars to enable them to withstand certain temperature exposure tests, and the addition of head shields and special couplers to prevent mounting or head puncture by adjacent cars.

The second major influence on tank car design, the Association of American Railroads (AAR), is a trade association of U.S., Mexican, and Canadian rail carriers. Its chief technical functions are performed by standing committees under its Mechanical Division. These committees are comprised principally of members from the railroad industry but also include representatives of shipping companies and owners of leased fleets.

The AAR Mechanical Division regulates tank car design for nonregulated commodities in cooperation with the DOT, and, where appropriate, issues AAR "Special Permits" for such commodities. In addition, the AAR is concerned with:

- Safety of railroad and shipper employees
- Prevention of shipment loss or damage
- Compatibility of all rail equipment
- Structural and mechanical design requirements.

The AAR Bureau of Explosives serves as the railroads' self-regulating control agency, as it maintains a group of field inspectors who are primarily concerned with the safety of regulated commodities transportation. The AAR Bureau maintains its own testing facilities for classifying regulated commodities for transportation and consults with the DOT and carriers, in cases it judges appropriate, on applications for both DOT "exemptions" and AAR "Special Permits."

Another important activity of this AAR Bureau is the republication of regulations and their updates as issued by the DOT's Materials Transportation Bureau. These appear in Bureau of Explosives' Tariff No. BOE-6000,[1] entitled "Hazardous Materials Regulations of the Department of Transportation Including Specifications for Shipping Containers."

Under the Mechanical Division, the AAR Tank Car Committee reviews tank car technical matters. One of its main functions is to develop specifications for tank car design, construction, and repair. All applications for the construction of tank cars must be approved by this committee before being recommended to the DOT. (Current DOT tank car specifications are listed in Appendix C.) The Committee also advises the DOT on regulated commodities and provides for the control of nonregulated commodities in the

[1]Formerly Agent R. M. Graziano's Tariff No. 32.

interest of member railroads. The DOT, in turn, reviews the Committee's recommendations, and, if approved, issues a certificate of construction for placing the cars in service.

Tank car operations are also affected by the railroads that move the cars and by the regulations imposed upon them. For example, because of the poor condition of certain track, speed restrictions have been imposed on the railroads by the FRA, thereby decreasing the efficiency of tank cars moving over them.

The total number of railroad systems is being reduced as a result of the mergers of individual lines and systems into single lines (e.g., Conrail). The operational and administrative functions of railroads are basically monitored by the American Association of Railroads, with certain constraints imposed by various governmental agencies, as previously illustrated.

The railroads, as common carriers, are required to supply all types of equipment for shipper use except tank cars. Railroads own relatively few tank cars (4,817 of the 202,811 cars in service in 1979), and those that they do own are used primarily in their own service. Shippers either own their own cars or lease their tank cars from tank car manufacturers or leasing companies. Since the railroads do not have a capital investment in fleets of tank cars, they pay mileage allowances to the owners of these cars.

Tank cars are used extensively by the petroleum industry. In addition to transporting finished products to bulk plants and consumers, cars are used to transport inbound materials that are an integral part of operations. A considerable amount of crude oil is moved from gathering areas to refineries, particularly in areas where pipelines are not available, and frequently, depending upon the location of marine facilities in relationship to blending operations, lube oils are transported in cars to the facilities and then loaded into tankers. This method of transporting lubes ensures the integrity of the lube since clingage in pipelines would contaminate subsequent batches of products passing through the lines.

TANK TRUCKS

Trucks are extremely flexible for petroleum deliveries, as they travel both regular and irregular routes and are not as restricted to their movements as are rail cars, which must follow fixed tracks to the receiving facility. This flexibility permits trucks to make many small quantity deliveries; for example, deliveries of heating oils to homes or service stations. Trucks are also more economical for short hauls and deliveries of small quantities when compared to other modes of transportation which deliver large quantities to fixed facilities.

Bulk motor carriers of petroleum products are subjected to regulations which may affect their operating efficiency. These

regulations are generally imposed by the ICC, the DOT (OHMO), the Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency (EPA), and state agencies. There are also short-term restrictions placed on weights carried in certain states at certain times of the year, particularly in the spring when the winter thaw takes place.

The operating authority granted by the ICC or Public Service Commission of a state may restrict the trucks to hauling certain product(s) and operating within limited geographic areas; however, most truck carriers have interline agreements allowing a carrier to operate over another's authority, generally without the actual interchange of equipment. (It should be pointed out that specialized equipment, such as LPG tanks and tank trailers, is primarily shipper or carrier owned, but is dedicated to a particular shipper's service.)

While there are carrier conferences (associations of carriers operating within geographic areas), these conferences do not set standards as the AAR does for rail transportation. Regardless of their size, the carriers are administratively and operationally autonomous except for the governmental regulations of the agencies mentioned above. Private carriers are even more autonomous since the only governmental constraints to their operation are those of health and safety. This latter group is not restricted by geographic area by authorities or permits granted by ICC or Public Service Commission of states.

Trucks interrelate with other segments of the petroleum industry; i.e., they receive products for transportation and make deliveries to facilities and consumers. A greater use is made of trucks in the crude oil producing areas, since trucks pick up crude oil at the wellhead and deliver it to gathering points for shipment through pipelines to processing plants, i.e., refineries.

APPENDICES

Department of Energy
Washington, D.C. 20585

June 20, 1978

Dear Mr. Chandler:

The National Petroleum Council has prepared numerous studies in the past on the Nation's petroleum transportation systems. The last study on this subject was prepared over ten years ago and published on September 15, 1967.

The transportation data collected over the years by the Council has been used by the Federal Government for emergency preparedness planning purposes. The data includes information on major crude oil and petroleum product pipelines, natural gas transmission lines, inland waterway barges, tank cars and tank trucks. Detailed information is also included on the location, capacity and type of pump stations and compressor stations.

As part of the Government's overall review and update of emergency preparedness planning, current data are needed on the Nation's petroleum transportation systems. I, therefore, request the National Petroleum Council to undertake a detailed study to determine current petroleum and gas transportation capacities including natural gas transmission lines, crude oil and petroleum product pipelines, crude oil gathering lines in major producing areas, inland waterway barges, tank cars and tank trucks. With respect to transportation of oil and petroleum products, the study should cover the spatial and transportation relationships--the match ups--among refineries of varying capacities and crude oil sources.

The study should examine the industry's flexibility to meet dislocations of supply and outline the changing supply patterns of the petroleum and natural gas deliverability systems.

For the purpose of this study, I will designate the Deputy Assistant Secretary for Policy and Evaluation to represent me and to provide the necessary coordination between the Department of Energy and the National Petroleum Council.

Sincerely,

James R. Schlesinger
Secretary

Mr. Collis P. Chandler, Jr.
Chairman, National Petroleum Council
1625 K Street, N.W.
Washington, D. C. 20006

Department of Energy
Washington, D.C. 20585

June 20, 1978

Dear Mr. Chandler:

The ability of this Nation to withstand interruptions in normal oil supplies, whether by domestic dislocation or by foreign intervention, is immediately served by recourse to existing inventories of oil stocks. In addition, the United States has embarked on a Strategic Petroleum Reserve program to aid in meeting its commitments abroad and its commitments to consumers at home in case of another interruption of foreign oil supply. For industry and Government to respond appropriately to an emergency, our need for accurate information and understanding of primary petroleum inventories is greater than it has ever been.

Implicit in an understanding of petroleum inventories is the distinction between total stocks and those stocks which would be readily available for use. Such information is essential in evaluating correctly the extent of the contribution our oil stocks would be able to make in times of oil supply emergency and planning the development and use of the Strategic Petroleum Reserve.

Periodically the National Petroleum Council has conducted for the Department of the Interior a survey of the availability of petroleum inventories and storage capacity. The last such report was issued in 1974, the eighth in a series which began in 1948.

Accordingly, the National Petroleum Council is requested to prepare for the Department of Energy a new report on available petroleum inventories and storage capacity. This new report should emphasize the distinction between available stocks and those unavailable. For the purpose of this study, I will designate the Deputy Assistant Secretary for Policy and Evaluation to represent me and to provide the necessary coordination between the Department of Energy and the National Petroleum Council.

Sincerely,

James R. Schlesinger
Secretary

Mr. Collis P. Chandler, Jr.
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Independent Oil Operator/Producer

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Robert E. Yancey, President
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DOT TANK CAR SPECIFICATIONS

DOT SPECIFICATION	105A100ALW	105A100W	105A200ALW	105A200F	105A200W	105A300ALW	105A300W	105A400W	105A500W	105A600W
Material	Al alloy	Steel	Al alloy	Steel	Steel	Al alloy	Steel	Steel	Steel	Steel
Insulation	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required
Bursting pressure (psi)	500	500	500		500	750	750	1,000	1,250	1,500
Minimum plate thickness (inches)										
Shell and Heads	5/8	9/16§,¶	5/8	9/16¶	9/16§,¶	5/8	11/16*	11/16*	11/16*	11/16*
Test pressure (psi)	100	100	200		200	300	300	400	500	600
Start-to-discharge pressure (psi)	75	75	150	150	150	225	225	300	375	450
Start-to-discharge tolerance (psi)	±3.0	±3.0	±4.5	±4.5	±4.5	±6.75	±6.75	±9.0	±11.25	±13.5
Vapor tight (minimum) pressure (psi)	60	60	120	120	120	180	180	240	300	360
Valve flow rating pressure (maximum psi)	85	85	165	165	165	247.5	247.5	330	412.5	495
Manway cover, thickness, inches (minimum)	2-1/2†	2-1/4	2-1/2†	2-1/4	2-1/4	2-5/8†	2-1/4**	2-1/4**	2-1/4	2-1/4
Bottom washout	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
Bottom outlet	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited

*When Steel of 65,000 to 81,000 psi minimum tensile strength is used, the thickness of plates shall be not less than 5/8 inch, and when steel of 81,000 psi minimum tensile strength is used, the minimum thickness of plate shall be not less than 9/16 inch.

†When approved material other than aluminum alloys are used, the thickness shall be not less than 2-1/4 inches.

§When steel of 65,000 psi minimum tensile strength is used, minimum thickness of plates shall be not less than 1/2 inch.

¶For inside diameter of 87 inches or less, the thickness of plates shall not be less than 1/2 inch.

**When the use of nickel is required by the lading, the thickness shall not be less than 2 inches.

DOT TANK CAR SPECIFICATIONS

DOT SPECIFICATION	111A100ALW1	111A100ALW2	111A100W1*	111A100W2	111A100W3	111A100W4	111A100W5	111A100W6
Material	Al alloy	Al alloy	Steel	Steel	Steel	Steel	Steel	Alloy steel
Insulation	Optional	Optional	Optional	Optional	Required	Required	Optional	Optional
Bursting pressure (psi)	500	500	500	500	500	500	500	500
Minimum plate thickness (inches)								
Shell	5/8	5/8	7/16	7/16	7/16	7/16	7/16	7/16
Heads	5/8	5/8	7/16	7/16	7/16	7/16	7/16	7/16
Dome	None	None	None	None	None	None	None	None
Minimum expansion capacityt	2 percent In tank	2 percent In tank	2 percent In tank	2 percent In tank	2 percent In tank		2 percent In tank	2 percent In tank
Test pressure (psi)	100	100	100	100	100	100	100	100
Safety relief devices	Valve or vent	Valve or vent	Valve or vent	Vent or valve	Valve or vent	Valve	Vent	Valve or vent
Valve start-to-discharge pressure (psi) (± 3 psi)	75	75	75	75	75	75		75
Valve vapor tight pressure (minimum psi)	60	60	60	60	60	60		60
Valve flow rating pressure (maximum psi)	85	85	85	85	85	85		85
Vent bursting pressure (psi)t	100	100	100	100	100	Prohibited	100	100
Gaging devices	Required	Required	Required	Required	Required	Required	Required	Required
Top loading and unloading device	Optional	Required (valves optional)	Optional	Required (valves optional)	Optional (if used valves required)	Required (valves required)	Required (valves required)	Optional (if used valves required)
Bottom outlet	Optional	Prohibited	Optional	Prohibited	Optional	Prohibited	Prohibited	Optional
Bottom washout	Optional	Optional	Optional	Optional	Optional	Prohibited	Prohibited	Optional

SOURCE: R. M. Graziano's Tariff No. 32, December 15, 1978.

*Tanks converted to DOT-111A series from existing forge-welded specification. DOT-105A300, 400 or 500 tanks, by modification using conversion details complying with DOT-111A specification requirements, shall be stenciled by substituting the letter "F" for the letter "W" in the specification designation.

tMandatory compliance with 49 CFR 179.201-1 is January 1, 1979.

DOT TANK CAR SPECIFICATIONS

DOT SPECIFICATIONS	103W	104W	111A60ALW1	111A60ALW2	111A60W1*	111A60W2	111A60W5	111A60W7
Material	Steel	Steel	Al alloy	Al alloy	Steel	Steel	Steel	Alloy steel
Insulation	Optional	Required	Optional	Optional	Optional	Optional	Optional	Optional
Bursting pressure (psi)	240	240	240	240	240	240	240	240
Minimum plate thickness (inches)								
Shell	§	§	1/2	1/2	7/16	7/16	7/16	7/16
Heads	§	§	1/2	1/2	7/16	7/16	7/16	7/16
Dome	Required	Required	None	None	None	None	None	None
Minimum expansion capacityt	2 percent in dome	2 percent in dome	2 percent in tank	2 percent in tank	2 percent in tank	2 percent in tank	2 percent in tank	2 percent in tank
Test pressure (psi)	60	60	60	60	60	60	60	60
Safety relief devices.	Valve or vent	Valve or vent	Valve or vent	Valve or vent	Valve or vent	Vent or valve	Vent	Valve or vent
Valve start-to-discharge pressure (psi) (± 3 psi)	35	35	35	35	35	35		35
Valve vapor tight pressure (minimum psi)	28	28	28	28	28	28		28
Valve flow rating pressure (maximum psi)	45	45	45	45	45	45		45
Vent bursting pressure (psi)t	60	60	60	60	60	60	60	60
Gaging devices	Optional	Optional	Required	Required	Required	Required	Required	Optional
Top loading and unloading devices	Optional	Optional	Optional	Required (valves optional)	Optional	Required (valves optional)	Required (valves optional)	Required (valves optional)
Bottom outlet	Optional	Optional	Optional	Prohibited	Optional	Prohibited	Prohibited	Prohibited
Bottom washout	Optional	Optional	Optional	Optional	Optional	Optional	Prohibited	Prohibited

*Tanks converted to DOT-111A series from existing forge-welded specification. DOT-105A300, 400 or 500 tanks, by modification using conversion details complying with DOT-111A specification requirements, shall be stenciled by substituting the letter "F" for the letter "W" in the specification designation.

†Mandatory compliance with 49 CFR 179.201-1 is January 1, 1979.

§Varies by location on the tank.

DOT TANK CAR SPECIFICATIONS

DOT SPECIFICATIONS	103A-ALW	103AW	103ALW	103ANW	103BW	103CW	103DW	103EW
Material	Al Alloy	Steel	Al alloy	Nickel	Steel	Alloy steel	Alloy steel	Alloy steel
Insulation	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Bursting pressure (psi)	240	240	240	240	240	240	240	240
Minimum plate thickness (inches)								
Shell	1/2		1/2					
Heads	1/2		1/2					
Dome	Required	Required	Required	Required	Required	Required	Required	Required
Minimum expansion capacity*	1 percent in dome	1 percent in dome	2 percent in dome	1 percent in dome	1 percent in dome	1 percent in dome	2 percent in dome	1 percent in dome
Test pressure (psi)	60	60	60	60	60	60	60	60
Safety relief devices	Valve or vent	†	Valve or vent	†	Vent	Valve	Valve or vent	Valve or vent
Valve start-to-discharge pressure (psi) (± 3 psi)	35	35	35	35		35	35	35
Valve vapor tight pressure (minimum psi)	28	28	28	28		28	28	28
Valve flow rating pressure (maximum psi)	45	45	45	45		45	45	45
Vent bursting pressure (psi)*	60	60	60	60	60	Prohibited	60	60
Gaging devices	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Top loading and unloading devices	Required (valves optional)	Required (valves optional)	Optional	Required (valves optional)	Required (valves optional)	Required (valves optional)	Optional	Required (valves optional)
Bottom outlet	Prohibited	Prohibited	Optional	Prohibited	Prohibited	Prohibited	Optional	Prohibited
Bottom washout	Optional	Optional	Optional	Optional	Prohibited	Prohibited	Optional	Optional

SOURCE: R. M. Graziano's Tariff No. 32, December 15, 1978.

*Mandatory compliance with 49 CFR 179.201-1 is January 1, 1979.

†As prescribed by the tariff.

DOT TANK CAR SPECIFICATIONS

DOT SPECIFICATION	109A100ALW	109A200ALW	109A300ALW	109A300W	112A200W§§	112A340W§§	112A400W§§	112A500W§§	114A340W§§	114A400W§§
Material	Al alloy	Al alloy	Al alloy	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Insulation	Optional	Optional	Optional	Optional	None¶	None¶	None¶	None¶	None¶	None¶
Bursting pressure (psi)	500	500	750	750	500	850	1,000	1,250	850	1,000
Minimum plate thickness (inches)										
Shell and Heads	5/8	5/8	5/8	11/16*	9/16§,**	11/16*	11/16*	11/16*	11/16*	11/16*
Test pressure (psi)	100	200	300	300	200	340	400	500	340	400
Safety relief valves (psi)										
Start-to-discharge pressure (psi)	75	150	225	225	150	255	300	375	255	300
Start-to-discharge tolerance (psi)	±3.0	±4.5	±6.75	±6.75	±4.5	±7.65	±9.0	±11.25	±7.65	±9.0
Vapor tight (minimum) pressure (psi)	60	120	180	180	120	204	240	300	204	240
Valve flow rating pressure (maximum psi)	85	165	247.5	247.5	165	280.5	330	412.5	280.5	330
Manway cover, thickness, inches (minimum)	2-1/2†	2-1/2†	2-5/8†	2-1/4	2-1/4	2-1/4	2-1/4	2-1/4	††	††
Special References										
Bottom washout	Optional	Optional	Optional	Optional	Prohibited	Prohibited	Prohibited	Prohibited	Optional	Optional
Bottom outlet	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Optional	Optional

SOURCE: R. M. Graziano's Tariff No. 32, December 15, 1978.

*When Steel of 65,000 to 81,000 psi minimum tensile strength is used, the thickness of plates shall be not less than 5/8 inch, and when steel of 81,000 psi minimum tensile strength is used, the minimum thickness of plate shall be not less than 9/16 inch.

†When approved material other than aluminum alloys are used, the thickness shall be not less than 2-1/4 inches.

§When steel of 65,000 psi minimum tensile strength is used, minimum thickness of plates shall be not less than 1/2 inch.

¶After December 31, 1980, each specification 112 and 114 tank car used for the transportion of flammable gases must be equipped with thermal protection and tank head puncture resistance systems in accordance with Sec. 179.105.

**For inside diameter of 87 inches or less, the thickness of plates shall not be less than 1/2 inch.

††See AAR specifications for tank cars, Appendix E, E4.01 and 179.103-2.

§§When tank car head shields meeting the requirements of § 179.100 have been applied, an "S" must be substituted for the "A" in the specification marking.

ANALYSIS OF TANK CARS SUITABLE TO HAUL PETROLEUM IN AN EMERGENCY

As of June 15, 1979, there were 107,552 tank cars having a total capacity of 2.2 billion gallons in the U.S. tank car fleet which were considered suitable for carrying crude oil and petroleum products. This represents a 28 percent increase in gallon capacity from the 1967 National Petroleum Council study, but a 24 percent decrease in the actual number of cars. This decrease reflects the industry's tendency to replace older, smaller cars with new 20,000+ gallon non-pressure and 33,000+ gallon pressure cars. This trend can be drawn from an analysis of the tables in Appendix D, which provide a complete breakdown of the total fleet by size and type as well as by car age. Only a limited number of the 1-5 year old cars are less than 13,500 gallons in capacity, while very few cars older than 20 years are of greater capacity. It can therefore be expected that future retirements of old equipment will not result in a loss in total fleet gallon capacity as new, larger cars take their place.

As of June 15, 1979, the U.S. tank car fleet was comprised of 202,811 cars with a 3.6 billion gallon capacity. This count includes the majority of the current industry production backlog which the tank manufacturers indicated was approximately 2 1/2 percent of the current fleet. It also includes a number of older cars which have been retired from service but have not yet been removed from the UMLER file. The 4,817 railroad owned tank cars with an 88 million gallon capacity reported in the table on Page D-8 (versus the 6,000 cars with 60 million gallons in capacity in service in 1967) are used internally for diesel fuel service and would not be available for alternate service in an emergency. In fact, this fleet might have to be expanded in such a situation. The 4,817 cars do not include a number of generally older cars that are not used by the railroads in interchange service.

The cars listed in the following tables as non-suitable for carrying petroleum, approximately 45 percent of the U.S. tank car fleet, include:

- All Canadian and Mexican cars
- All aluminum cars
- All acid service cars
- All caustic soda liquid cars
- All clay slurry and titanium dioxide cars
- All chlorine, liquid carbon dioxide, hydrogen sulfide, and hydrocyanic acid cars
- All lined cars

- All special feature cars except those with alloy fittings
- All tank cars built to the following DOT specifications: 107, 109, 113, 115, 120, 121, 204, and 206.

Some of these cars are excluded because they are equipped with safety vents in lieu of safety valves. Others have impractical operating characteristics for the limited range of petroleum based products that they could safely carry, while still others are so highly specialized that transfer to another service would be difficult to justify, except in the most drastic of national emergencies.

Summary of Demographic Breakdown of U.S. Tank Car Fleet
(June 15, 1979)

	Age All Years						
	Under 8,500 Gallons	8,500 to 13,499 Gallons	13,500 to 20,499 Gallons	20,500 to 30,499 Gallons	Over 30,500 Gallons	Total Number	Total Capacity
Private Non-Pressure							
Uninsulated	996	2,837	434	10,390	561	15,218	306,131,695
Coiled	3,875	2,674	2,835	14,429	106	23,919	429,313,277
Insulated	387	3,944	130	712	10	5,183	64,048,976
Coiled	1,578	11,689	1,336	18,067	176	32,846	583,110,649
Total	6,836	21,144	4,735	43,598	853	77,166	1,382,604,597
Private Pressure							
Uninsulated	0	627	273	2,060	15,350	18,310	583,595,930
Insulated	599	6,897	92	2,457	2,031	12,076	209,331,725
Total	599	7,524	365	4,517	17,381	30,386	792,927,655
Unsuitable Total	12,755	30,076	32,002	11,060	4,549	90,442	1,327,217,268
RR Owned Total	233	642	1,411	2,518	13	4,817	88,283,117
Grand Total	20,423	59,386	38,513	61,693	22,796	202,811	3,591,032,637

SOURCE: Universal Machine Language Equipment Register, Association of American Railroads.

Demographic Breakdown of U.S. Tank Car Fleet
(June 15, 1979)

Age
1 - 5 Years

	Under 8,500 Gallons	8,500 to 13,499 Gallons	13,500 to 20,499 Gallons	20,500 to 30,499 Gallons	Over 30,500 Gallons	Total Number	Total Capacity
Private Non-Pressure							
Uninsulated	0	0	242	1,584	263	2,089	52,520,020
Coiled	0	0	111	2,599	1	2,711	60,325,622
Insulated	0	0	29	128	10	167	3,638,694
Coiled	28	97	193	7,535	0	7,853	177,330,684
Total	28	97	575	11,846	274	12,820	293,815,020
Private Pressure							
Uninsulated	0	0	4	101	560	665	21,746,499
Insulated	0	0	14	1,690	2,031	3,735	111,346,275
Total	0	0	18	1,791	2,591	4,400	133,092,774
Unsuitable Total	681	1,539	14,697	3,984	1,550	22,451	395,544,889
RR Owned Total	0	0	90	353	12	455	10,219,542
Grand Total	709	1,636	15,380	17,974	4,427	40,126	832,672,225

Demographic Breakdown of U.S. Tank Car Fleet
(June 15, 1979)

Age
6 - 10 Years

	Under 8,500 Gallons	8,500 to 13,499 Gallons	13,500 to 20,499 Gallons	20,500 to 30,499 Gallons	Over 30,500 Gallons	Total Number	Total Capacity
Private Non-Pressure							
Uninsulated	1	4	72	3,908	71	4,056	98,347,021
Coiled	11	139	565	6,256	70	7,041	149,797,092
Insulated	0	0	14	242	0	256	5,748,304
Coiled	11	95	374	7,203	51	7,734	177,590,878
Total	23	238	1,025	17,609	192	19,087	431,483,295
Private Pressure							
Uninsulated	0	0	73	725	2,516	3,314	105,484,202
Insulated	0	2	0	43	0	45	1,102,082
Total	0	2	73	768	2,516	3,359	106,586,284
Unsuitable Total	412	1,131	9,461	3,720	1,646	16,370	309,123,280
RR Owned Total	10	0	75	1,013	0	1,098	23,462,166
Grand Total	445	1,371	10,634	23,110	4,354	39,914	870,655,025

Demographic Breakdown of U.S. Tank Car Fleet
(June 15, 1979)

	Age 11 - 15 Years						
	Under 8,500 Gallons	8,500 to 13,499 Gallons	13,500 to 20,499 Gallons	20,500 to 30,499 Gallons	Over 30,500 Gallons	Total Number	Total Capacity
Private Non-pressure							
Uninsulated	83	390	85	3,640	227	4,425	95,390,734
Coiled	135	619	790	4,296	35	5,875	115,791,749
Insulated	7	97	35	149	0	288	4,855,029
Coiled	124	343	470	3,046	125	4,108	85,911,856
Total	349	1,449	1,380	11,131	387	14,696	301,949,368
Private Pressure							
Uninsulated	0	37	91	292	9,253	9,673	322,012,504
Insulated	18	40	33	237	0	328	6,760,367
Total	18	77	124	529	9,253	10,001	328,772,871
Unsuitable Total	1,887	6,579	6,704	2,554	1,279	19,003	294,393,868
RR Owned Total	45	28	148	980	1	1,202	24,112,052
Grand Total	2,299	8,133	8,356	15,194	10,920	44,902	949,228,159

Demographic Breakdown of U.S. Tank Car Fleet
(June 15, 1979)

Age
16 - 20 Years

	Under 8,500 Gallons	8,500 to 13,499 Gallons	13,500 to 20,499 Gallons	20,500 to 30,499 Gallons	Over 30,500 Gallons	Total Number	Total Capacity
Private Non-Pressure							
Uninsulated	91	89	35	1,166	0	1,381	26,553,680
Coiled	537	105	1,095	1,242	0	2,979	53,184,928
Insulated	26	54	52	193	0	325	5,709,214
Coiled	206	743	294	283	0	1,526	21,019,924
Total	860	991	1,476	2,884	0	6,211	106,467,746
Private Pressure							
Uninsulated	0	5	54	942	3,020	4,021	126,753,210
Insulated	154	142	45	487	0	828	13,932,033
Total	154	147	99	1,429	3,020	4,849	140,685,243
Unsuitable Total	2,580	4,818	897	754	74	9,123	104,521,474
RR Owned Total	28	60	62	172	0	322	6,206,851
Grand Total	3,622	6,016	2,534	5,239	3,094	20,505	357,881,314

Demographic Breakdown of U.S. Tank Car Fleet
(June 15, 1979)

	Age 21+ Years						
	Under 8,500 Gallons	8,500 to 13,499 Gallons	13,500 to 20,499 Gallons	20,500 to 30,499 Gallons	Over 30,500 Gallons	Total Number	Total Capacity
Private Non-Pressure							
Uninsulated	821	2,354	0	92	0	3,267	33,320,240
Coiled	3,192	1,811	274	36	0	5,313	50,213,866
Insulated	354	3,793	0	0	0	4,147	44,097,735
Coiled	1,209	10,411	5	0	0	11,625	121,257,307
Total	5,576	18,369	279	128	0	24,352	248,889,168
Private Pressure							
Uninsulated	0	585	51	0	1	637	7,599,515
Insulated	427	6,713	0	0	0	7,140	76,190,968
Total	427	7,298	51	0	1	7,777	83,790,483
Unsuitable Total	7,195	16,009	243	48	0	23,495	223,633,757
RR Owned Total	150	554	1,036	0	0	1,740	24,282,506
Grand Total	13,348	42,230	1,609	176	1	57,364	580,595,914

GEOGRAPHIC DISTRIBUTION OF TANK CARS

The following table presents a geographic breakdown of the U.S. tank car fleet. Because of the tank car's high degree of geographic flexibility as compared to pipeline or waterborne transportation, tank cars do not move along discreet corridors. As a result, the data presented reflect a sample of tank car shipment origin concentrations. The data are presented by state within PAD districts and reflect high concentrations of tank cars in PADs I, II, and III. Tank car origins were selected as the basis for the geographic presentation because tank cars spend more time at the loading point than at any other specific locations.

The geographic analysis of tank car locations presented in the table is based upon a sample of the origin points of tank car movements, the ICC One Percent Waybill Sample. The waybill statistics are compiled by a sampling of audited revenue waybills submitted to the FRA.

The sample of waybills or comparable documents are submitted by line haul operating railroads (not switching or terminal railroads) which have $3 million or more average operating revenues over a three year period. The sample includes import, export, transit, rebilled, and trailer on flat car traffic. It excludes shipments originating in Canada or Mexico, and shipments weighing less than 10,000 pounds moving on less-than-carload or any-quantity rates.

By ICC order the reporting terminating railroads select waybills numbered by the originating carrier, ending in either "1" or "01". Most waybills represent one car shipments, but some are multicar shipments of from 2 to 100 cars. The ICC developed a sampling technique for these multi-car bills; i.e., selecting and reporting every 100th car from bills covering six or more loads.

There are limitations inherent in the data since cars weighing less than 10,000 pounds moving at carload rates are included, and shipments of 10,000 pounds or more moving at less than carload or any quantity rates are included. In addition, the short line mileage is used, and if there are several routes from origin to destination using short line mileage, the minimum distance will be reported in the sample.

Analysis of 1977 ICC One Percent Waybill Sample*
TANK CAR MOVEMENT
All Cars

Origin	Number of Carloads	Percentage of Total Carloads	Tons
PAD I			
Connecticut	28	.25	2,171
Delaware	59	.53	4,231
Florida	264	2.35	20,630
Georgia (North)	164	1.46	13,053
Georgia (South)	227	2.02	15,551
Maine	267	2.37	14,940
Maryland	49	.44	3,696
Massachusetts	29	.26	2,364
New Hampshire	7	.06	386
New Jersey	253	2.25	16,427
New York (East Section)	36	.32	2,903
New York (West Section)	144	1.28	9,738
North Carolina (East Section)	143	1.27	11,218
North Carolina (West Section)	26	.23	1,790
Pennsylvania (East)	127	1.13	7,828
Pennsylvania (West)	125	1.11	7,715
South Carolina	116	1.03	8,344
Virginia (North)	14	.12	928
Virginia (South)	46	.41	2,743
West Virginia	290	2.58	20,557
PAD I TOTAL	2,414	21.47	167,213
PAD II			
Illinois (North)	393	3.50	22,973
Illinois (South)	266	2.37	17,496
Indiana (North)	171	1.52	11,083
Indiana (South)	16	.14	1,033
Iowa (East)	323	2.88	22,371
Iowa (West)	83	.74	6,226
Kansas (East)	210	1.87	15,902
Kansas (West)	22	.20	1,627
Kentucky (North)	80	.71	5,354
Kentucky (South)	117	1.04	9,311
Michigan (South)	181	1.61	12,166
Minnesota	116	1.03	7,261
Missouri (North)	99	.88	5,965
Missouri (South)	14	.12	1,025
Nebraska	94	.84	6,688
North Dakota	43	.38	3,108
Ohio (North)	229	2.04	15,527
Ohio (South)	164	1.46	11,851
Oklahoma (East)	194	1.73	13,961
Oklahoma (West)	23	.21	1,248
South Dakota	5	.04	333

Origin	Number of Carloads	Percentage of Total Carloads	Tons
Tennessee (East)	149	1.33	11,927
Tennessee (West)	167	1.49	11,248
Wisconsin (North)	64	.57	4,325
Wisconsin (South)	11	.10	491
PAD II TOTAL	3,234	28.80	220,500
PAD III			
Alabama	273	2.43	18,697
Arkansas (North)	11	.10	757
Arkansas (South)	86	.77	5,447
Louisiana (East)	1,058	9.43	82,518
Louisiana (West)	367	3.27	25,866
Mississippi	384	3.42	27,109
New Mexico (East)	86	.76	7,234
New Mexico (West)	119	1.06	10,502
Texas (Northeast)	210	1.87	13,633
Texas (Northwest)	192	1.71	14,446
Texas (Southeast)	1,570	14.07	116,744
Texas (Southwest)	168	1.50	14,971
PAD III TOTAL	4,524	40.39	337,924
PAD IV			
Colorado (East)	57	.51	4,548
Colorado (West)	18	.16	1,333
Idaho	39	.35	4,084
Montana (East)	76	.68	5,715
Montana (West)	10	.09	987
Utah	131	1.17	9,668
Wyoming (East)	18	.16	1,404
Wyoming (West)	88	.78	6,966
PAD IV TOTAL	437	3.90	34,705
PAD V			
Arizona	35	.31	3,089
California (North)	173	1.54	12,645
California (South)	236	2.10	19,066
Nevada	18	.16	1,535
Oregon	25	.22	1,865
Washington	123	1.10	9,199
PAD V TOTAL	610	5.43	47,399
GRAND TOTAL	11,219	100.00%†	807,741

*Represents one percent of tank car movements in the United States in the course of the year.

†Percentages do not total 100 percent due to rounding.

EIA-150B
(4-79)

Form Approved
OMB No. 038-R0404

NATIONAL PETROLEUM COUNCIL
1979 SURVEY OF TANK VEHICLES

Company name: _____

Company address: _____

_____ Zip Code: _____

Person to be contacted by Price Waterhouse & Co. should questions arise about your response to this survey:

Name: _____ Title: _____

Phone: ( ) _____

Company's transportation activities (check all applicable):

( ) For-hire common carrier

( ) Private carrier

( ) Jobber or commission agent

( ) Cooperative

( ) Other (please detail) _____

( ) This company does not own or lease tank vehicles. (If you have checked this last box, please return this page in the envelope provided to Price Waterhouse & Co.)

_____ _____
(Signature of person completing the questionnaire) (Date)

Please return the completed questionnaire in the envelope provided to:

Price Waterhouse & Co.
OGS--Department 82
1801 K Street, N.W.
Washington, D.C. 20006

4/79

The following questions deal only with owned and/or leased tank trucks, tank trailers, and tank semi-trailers, the capacity of which is more than 3,500 U.S. gallons water capacity. An "owned" vehicle is defined as a unit which you own and operate or which you own and have leased to another party for a period of less than one year. A "leased" vehicle is defined as one under contract for your exclusive use and control for a period of one year or more.

1. What was the total number of owned and leased tank vehicles, as of December 31, 1978, in your fleet? Count tank trucks, tank trailers, and tank semi-trailers individually and show the total only. _____

   (a) Total owned _____
   (b) Total leased _____

2. Of the total (both owned and leased), how many vehicles are designed primarily to transport liquid petroleum products, including LPG and LNG? _____

3. Of the total (both owned and leased), how many vehicles are designed primarily to transport other (non-petroleum) liquids? _____

4. Of the total (both owned and leased), how many vehicles are designed primarily to transport compressed gases? _____

5. What was the total number of tank vehicles "on order" as of December 31, 1978? _____

6. Number of power units owned/leased: _____

7. Average "length of haul" (in round-trip miles) petroleum movements: _____

8. Average "length of haul" (in round-trip miles) other than petroleum movements: _____

9. Tank trucks, tank trailers, and tank semi-trailers used for the transportation of hazardous materials (including most petroleum products) are constructed to specifications of either the ICC (pre-1967 model) or DOT (post-1967 model). With respect to your total fleet (both owned and leased), please provide the following breakdown according to specification number. If you have no tank vehicles of a particular specification number, enter zero ("0") under the column headed "Number of Tank Vehicles Owned/Leased" for that specification number.

ICC/DOT Spec. No.	Number of Tank Vehicles Owned/Leased	Average Age in Years	Average Shell Capacity in Gallons
MC 300			
MC 301			
MC 302			
MC 303			
MC 304			
MC 305			
MC 306			
MC 307			
MC 310			
MC 311			
MC 312			
MC 330			
MC 331			
Non Spec. Liquid Tanks			

10. Please list below the approximate location or domicile of your tank vehicle fleet--owned and/or leased. Attach additional sheets if necessary. (If all of your vehicles are domiciled at the address noted on the cover page, check this box ( ) and do not complete this section.)

Number of Vehicles	Postal Zip Code

NATIONAL PETROLEUM COUNCIL
1979 SURVEY OF TANK VEHICLES

Data as of December 31, 1978:

No. of tank vehicles owned_____ Leased_____
No. of tank vehicles on order as of December 31, 1978_____
Average age of tank vehicles_____ Average capacity_____ (gal)
No. of power units owned/leased_____
Domicile of tank vehicles by state:

State	No. of Vehicles

I have not reported any data above because:

_____ My company has no tank vehicles 3,500 gal capacity or greater.
_____ My company does not own or lease tank vehicles.
_____ My company is no longer in business or has been sold.
_____ I have already responded to the questionnaire.
_____ I do not have time to respond.
_____ Other:_____

Person to contact if questions arise_____
Phone ( )_____

Please fold, staple and return this card as soon as possible.
Your cooperation is sincerely appreciated.

APPENDIX G

TABULATION OF NPC 1979 TANK VEHICLE SURVEY RESPONSES

Table of Contents

TABULATION OF NPC 1979 TANK VEHICLE SURVEY RESPONSES

METHODOLOGY

The National Petroleum Council distributed a questionnaire to collect the base data from which it could estimate the number of tank vehicles in excess of a 3,500-gallon capacity that could safely haul petroleum products in an emergency.

The questionnaire was distributed to the following organizations:

- American Petroleum Institute (Central Committee on Highway Transportation) (API)
- Chemical Manufacturers Association (CMA)
- National Council of Farmer Cooperatives (NCFC)
- National Oil Jobbers Council (NOJC)
- National Tank Truck Carriers (NTTC).

The National Petroleum Council contracted the certified public accounting firm of Price Waterhouse & Co. to collect and aggregate the survey returns. No individual company data was released to any industry, government, or National Petroleum Council representatives. There were 7,125 questionnaires distributed to the member companies of these trade associations, with an initial response rate of 24 percent.

A follow-up postcard survey was distributed to the 5,428 non-respondent member companies of the CMA, NCFC, and NOJC. This second survey received responses from 40 percent of the companies polled, which resulted in an overall response rate of 54 percent. (See Appendix F for a copy of the questionnaire and postcard.)

The largest percentage of non-respondents were member companies of NOJC. To obtain general information about these companies (e.g., what percentage own or lease tank vehicles of 3,500+ gallons in capacity, and the average number of such vehicles per company) Price Waterhouse & Co. was requested to undertake a telephone sample of two percent of the non-respondents. This sample received a 100 percent response, and served to reinforce the conclusions resulting from the questionnaire and postcard surveys regarding the overall tank vehicle population.

The actual survey results, as compiled and reported by Price Waterhouse & Co., are presented in this appendix. The results are tabulated by type of operator (private carrier, jobber/commission agent, cooperative, or for-hire common carrier) and domicile location.

SUMMARY

The total number of suitable vehicles reported in the questionnaire and postcard surveys was 38,856. By extrapolation, taking into consideration the percentage of questionnaires for each association which would be "not applicable" to the member companies, it was estimated that, as of December 31, 1978, there were 50,010 tank vehicles in the United States in excess of 3,500 gallons in capacity which might be called upon to safely haul petroleum products (including LPG and NLG) in the event of a national emergency. These vehicles are estimated to have a total capacity of 364.4 million gallons.

A geographic analysis of tank vehicle locations indicates that the overwhelming majority of the vehicles are domiciled in PADs I and II.

TABLE 1

Overall Response Summary

	API	NTTC	NOJC	NCFC	CMA	Unidentifiable	Total
1. Received Questionnaires and/or Postcards*	36	174	6,657	82	176	--	7,125
2. Responding Companies Reporting Data	31	131	1,142	15	39	--	1,358
(%)	(86)	(75)	(17)	(18)	(22)		(19)
3. Responding Companies Not Reporting Data	3	11	2,320	66	65	31	2,496
(%)	(8)	(6)	(35)	(80)	(37)		(35)
4. Total No. of Companies Responding	34	142	3,462	81	104	31	3,854
(%)	(94)	(82)	(52)	(99)	(59)		(54)
5. No. of Companies not Responding	2	32	3,195	1	72	(31)	3,271
(%)	(6)	(18)	(48)	(1)	(41)		(46)

*API and NTTC members received questionnaires only.

TABLE 2

Analysis of Respondents to Questionnaire

	API	NTTC	NOJC	NCFC	CMA	Total
1. Number of Companies Receiving Questionnaire	36	174	6,657	82	176	7,125
2. Number of Companies Reporting Data	31	131	548	10	25	745
3. Number of Responding Companies Not Reporting Data	3	11	869	19	29	931
4. Total Number of Companies Responding (Line 2 + Line 3)	34	142	1,417	29	54	1,676
5. Percentage of Companies Responding (Line 4 ÷ Line 1)	94%	82%	21%	35%	31%	24%
				22%		
6. Number of Tank Vehicles Owned and Leased by Companies Reporting Data						
• Owned	6,906	22,779		4,553		34,238
• Leased	818	2,722		1,078		4,618
• Total	7,724	25,501		5,631		38,856
7. Vehicles Owned and Leased per Reporting Company						
• Mean	249.2	194.7		9.7		52.2
• Median	181.0	89.0		2.0		3.0

TABLE 3

Analysis of Respondents
To Postcard Follow-Up

	NOJC	NCFC	CMA	Unidentifiable	Total
1. Number of Companies Receiving Postcard	5,240	55	133	--	5,428
2. Number of Responding Companies Reporting Data	594	5	14	--	613
3. Number of Responding Companies Not Reporting Data	1,451	47	36	31	1,565
4. Total Number of Companies Responding (Line 2 + Line 3)	2,045	52	50	31	2,178
5. Percentage of Companies Responding	39%	95%	38%	--	40%
6. Number of Vehicles Owned and Leased by Companies Reporting Data:					
• Owned	2,708	218	196	--	3,122
• Leased	149	223	74	--	446
• Total	2,857	441	270	--	3,568
7. Vehicles Owned and Leased per Reporting Company					
• Mean	4.8	88.2	19.3	--	5.8
• Median	2.0	48.0	6.0	--	2.0

TABLE 4

Distribution of Companies
Reporting Data from Questionnaire
By Size Of Fleet

Size of Fleet (No. Vehicles Owned/Leased)	API		NTTC		Other		Total	
	No. of Co's.	% of Co's.	No. of Co's.	% of Co's.	No. of Co's.	% of Co's.	No. of Co's.	% of Co's.
1-3	-	-	2	1.5	413	70.8	415	55.7
4-6	1	3.2	4	3.0	84	14.4	89	12.0
7-10	1	3.2	3	2.3	32	5.5	36	4.8
11-15	-	-	8	6.1	14	2.4	22	3.0
16-25	2	6.5	9	6.9	16	2.7	27	3.6
26-50	6	19.4	14	10.7	9	1.5	29	3.9
51-100	4	12.9	31	23.7	4	.7	39	5.2
101-200	2	6.5	28	21.4	4	.7	34	4.6
201-300	4	12.9	11	8.4	1	.2	16	2.2
301-500	6	19.3	10	7.6	5	.9	21	2.8
501-750	4	12.9	5	3.8	1	.2	10	1.3
751-1,000	1	3.2	3	2.3	-	-	4	.5
1,001-1,500	-	-	1	.8	-	-	1	.1
Over 1,500	-	-	2	1.5	-	-	2	.3
Total	31	100.0	131	100.0	583	100.0	745	100.0

TABLE 5

Distribution of Companies
Reporting Data from Postcard Follow-Up
By Size of Fleet

Size of Fleet (No. Vehicles Owned/Leased)	NOJC		NCFC		CMA		Total	
	No. of Co's.	% of Co's.	No. of Co's.	% of Co's.	No. of Co's.	% of Co's.	No. of Co's.	% of Co's.
1-3	412	69.4	1	20.0	4	28.6	417	68.0
4-6	110	18.5	-	-	4	28.6	114	18.6
7-10	36	6.1	-	-	1	7.1	37	6.1
11-15	11	1.8	1	20.0	1	7.1	13	2.1
16-25	14	2.3	-	-	-	-	14	2.3
26-50	6	1.0	1	20.0	2	14.3	9	1.5
51-100	3	.5	-	-	2	14.3	5	.8
101-200	1	.2	1	20.0	-	-	2	.3
201-300	1	.2	1	20.0	-	-	2	.3
301-500	-	-	-	-	-	-	-	-
501-750	-	-	-	-	-	-	-	-
715-1,000	-	-	-	-	-	-	-	-
1,001-1,500	-	-	-	-	-	-	-	-
Over 1,500	-	-	-	-	-	-	-	-
Total	594	100.0	5	100.0	14	100.0	613	100.0

TABLE 6

Age/Capacity Analysis of
Tank Vehicles

ICC/DOT Specification Number	Number of Vehicles 3 Yrs./Less	Average Capacity	Number of Vehicles 4 Yrs./More	Average Capacity
MC 300	15	7,687	261	6,442
MC 301	4	7,213	49	7,036
MC 302	2	6,375	216	7,820
MC 303	2	7,775	911	6,605
MC 304	34	8,971	1,059	6,131
MC 305	2	8,775	2,116	8,177
MC 306	908	8,017	13,198	7,951
MC 307	1,072	6,360	5,179	6,663
MC 310	1	8,700	54	3,861
MC 311	15	5,167	504	5,252
MC 312	115	4,989	1,612	4,615
Questionnaire Data Total	2,170	7,029	25,159	7,284
Postcard Data Total	286	7,441	3,139	6,543
Combined Data Total*	2,456	7,077	28,298	7,202

*Includes data only for vehicles for which both age and capacity data were reported.

TABLE 7

Summary of Data from Questionnaire,
by Type of Member

	Total	API Members	NTTC Members	Others
Total Tank Vehicles (Both Owned and Leased as of Dec. 31, 1978)	38,856	7,724	25,501	5,631
Total Vehicles Owned	34,238	6,906	22,779	4,553
Total Vehicles Leased	4,618	818	2,722	1,078
Vehicles Designed to Transport Liquid Petroleum Products	21,023	6,209	11,809	3,005
Vehicles Designed to Transport Other Non-Petroleum Liquids	10,215	616	8,203	1,396
Vehicles Designed to Transport Compressed Gases	2,798	597	1,463	738
Number of Tank Vehicles "On Order" (Dec. 31, 1978)	1,635	296	1,206	133
Number of Power Units Owned/Leased	35,971	6,852	21,910	7,209

TABLE 8

Summary of Data From Questionnaire,
by Type of Activity

	Total	For-Hire Common Carrier	Private Carrier	Jobber /Comm. Agent	Cooper-ative	Other
Total Tank Vehicles (Both Owned and Leased as of Dec. 31, 1978)	38,856	24,248	11,427	1,049	981	1,151
Total Vehicles Owned	34,238	21,535	10,307	983	286	1,127
Total Vehicles Leased	4,618	2,713	1,120	66	695	24
Vehicles Designed to Transport Liquid Petroleum Products	21,023	11,592	7,937	680	460	354
Vehicles Designed to Transport Other Non-Petroleum Liquids	10,215	7,176	1,982	220	41	796
Vehicles Designed to Transport Compressed Gases	2,798	1,467	811	29	490	1
Number of Tank Vehicles "On Order" (Dec. 31, 1978)	1,635	1,178	359	59	34	5
Number of Power Units Owned/Leased	35,971	21,681	11,163	923	2,083	121

TABLE 9

Distribution of Vehicles by
ICC/DOT Spec. No. -- Data from Questionnaire
(All Companies)

	All Companies			API Members			NTTC Members			Others		
	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity
ICC/DOT Specification Number												
MC 300	278	10	6,495	3	6	3,133	87	13	6,405	188	9	6,589
MC 301	53	10	7,050	-	-	-	9	13	5,387	44	10	7,390
MC 302	218	18	7,807	18	22	4,917	163	19	8,352	37	12	6,812
MC 303	929	13	6,597	15	14	3,174	877	13	6,660	37	18	6,495
MC 304	1,100	11	6,217	10	10	5,085	1,053	11	6,255	37	9	5,426
MC 305	2,175	14	8,178	113	14	7,543	1,902	14	8,235	160	13	7,943
MC 306	14,177	6	7,958	5,712	5	7,690	7,037	6	8,312	1,428	6	7,287
MC 307	6,309	5	6,689	68	5	6,604	5,513	5	6,510	728	6	8,049
MC 310	55	10	3,949	1	19	3,600	43	10	3,774	11	10	4,664
MC 311	540	12	5,221	20	14	4,170	504	12	5,277	16	14	4,756
MC 312	1,758	6	4,642	73	6	4,467	1,507	6	4,679	178	6	4,396
MC 330	705	15	9,085	98	16	8,527	505	14	9,906	102	18	5,556
MC 331	2,898	8	9,759	801	6	9,397	1,087	12	10,320	1,010	7	9,443
Non-Specification Liquid Tanks	5,723	8	6,283	310	7	5,530	4,257	8	6,400	1,156	8	6,054
Total Vehicles	36,918*	7	7,354	7,242	6	7,721	24,544	8	7,243	5,132	7	7,367

*Less than 38,856 total vehicles reported on "Summary of Data by Type of Member" table because some respondents did not provide ICC/DOT specification numbers for their vehicles.

TABLE 10

Distribution of Vehicles by
ICC/DOT Spec. No. -- Data from Questionnaire
(For-Hire Common Carriers)

ICC/DOT Specification Number	All Companies			API Members			NTTC Members			Others		
	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity
MC 300	101	12	6,709	-	-	-	87	13	6,405	14	9	8,593
MC 301	9	13	5,387	-	-	-	9	13	5,387	-	-	-
MC 302	172	19	8,168	-	-	-	163	19	8,352	9	13	4,850
MC 303	737	13	6,956	-	-	-	737	13	6,956	-	-	-
MC 304	1,042	11	6,235	-	-	-	1,042	11	6,235	-	-	-
MC 305	1,907	14	8,224	-	-	-	1,894	14	8,236	13	13	6,485
MC 306	6,606	6	8,534	-	-	-	6,554	6	8,539	52	7	7,929
MC 307	4,971	5	6,611	-	-	-	4,966	5	6,608	5	8	9,000
MC 310	43	10	3,774	-	-	-	43	10	3,774	-	-	-
MC 311	505	12	5,279	-	-	-	504	12	5,277	1	12	6,000
MC 312	1,473	6	4,658	-	-	-	1,472	6	4,657	1	12	6,000
MC 330	505	14	9,924	-	-	-	502	14	9,924	3	10	10,000
MC 331	1,091	12	10,347	-	-	-	1,064	12	10,355	27	10	10,000
Non-Specification Liquid Tanks	4,229	8	6,444	-	-	-	4,185	8	6,443	44	12	6,486
Total Vehicles	23,391	8	7,350	-	-	-	23,222	8	7,347	169	10	7,710

TABLE 11

Distribution of Vehicles by
ICC/DOT Spec. No. -- Data from Questionnaire
(Private Carriers)

ICC/DOT Specification Number	All Companies			API Members			NTTC Members			Others		
	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity
MC 300	87	8	5,399	3	6	3,133	-	-	-	84	8	5,480
MC 301	9	11	7,697	-	-	-	-	-	-	9	11	7,697
MC 302	8	18	6,981	3	20	8,000	-	-	-	5	17	6,370
MC 303	34	16	4,746	15	14	3,174	-	-	-	19	18	5,987
MC 304	42	9	5,231	10	10	5,085	-	-	-	32	9	5,277
MC 305	152	14	7,794	93	14	7,714	-	-	-	59	13	7,921
MC 306	6,276	5	7,575	5,594	5	7,709	-	-	-	682	6	6,474
MC 307	783	6	7,939	67	5	6,576	-	-	-	716	6	8,067
MC 310	9	11	3,844	1	19	3,600	-	-	-	8	10	3,875
MC 311	31	14	4,152	20	14	4,170	-	-	-	11	14	4,118
MC 312	240	6	4,402	73	6	4,467	-	-	-	167	6	4,374
MC 330	185	17	6,883	94	16	8,656	-	-	-	91	19	5,052
MC 331	1,210	7	8,986	650	6	9,196	-	-	-	560	7	8,742
Non-Specification Liquid Tanks	1,285	8	5,767	301	7	5,506	-	-	-	984	8	5,847
Total Vehicles	10,351	6	7,409	6,924	6	7,695	-	-	-	3,427	7	6,833

TABLE 12

Distribution of Vehicles by
ICC/DOT Spec. No. -- Data from Questionnaire
(Jobber or Commission Agents)

ICC/DOT Specification Number	All Companies			API Members			NTTC Members			Others		
	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity
MC 300	86	10	7,302	-	-	-	-	-	-	86	10	7,302
MC 301	33	9	7,130	-	-	-	-	-	-	33	9	7,130
MC 302	22	11	7,639	-	-	-	-	-	-	22	11	7,639
MC 303	17	16	7,206	-	-	-	-	-	-	17	16	7,206
MC 304	10	14	7,817	-	-	-	5	17	9,255	5	11	6,380
MC 305	80	12	8,127	-	-	-	-	-	-	80	12	8,127
MC 306	432	6	7,186	-	-	-	2	3	9,000	430	6	7,178
MC 307	121	3	7,056	-	-	-	118	3	7,079	3	7	6,167
MC 310	2	9	8,350	-	-	-	-	-	-	2	9	8,350
MC 311	3	11	6,767	-	-	-	-	-	-	3	11	6,767
MC 312	35	8	5,617	-	-	-	35	8	5,617	-	-	-
MC 330	4	17	6,450	-	-	-	3	16	6,933	1	18	5,000
MC 331	28	11	8,543	-	-	-	23	12	8,696	5	5	7,840
Non-Specification Liquid Tanks	176	11	6,276	-	-	-	72	13	3,875	104	10	7,937
Total Vehicles	1,049	8	7,096	-	-	-	258	8	6,186	791	8	7,393

TABLE 13

Distribution of Vehicles by
ICC/DOT Spec. No. -- Data from Questionnaire
(Cooperative)

ICC/DOT Specification Number	All Companies			API Members			NTTC Members			Others		
	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity
MC 300	1	24	5,500	-	-	-	-	-	-	1	24	5,500
MC 301	2	16	10,300	-	-	-	-	-	-	2	16	10,300
MC 302	15	22	4,300	15	22	4,300	-	-	-	-	-	-
MC 303	-	-	-	-	-	-	-	-	-	-	-	-
MC 304	-	-	-	-	-	-	-	-	-	-	-	-
MC 305	26	14	7,323	20	14	6,750	-	-	-	6	15	9,233
MC 306	368	6	8,604	118	7	6,771	-	-	-	250	6	9,470
MC 307	-	-	-	-	-	-	-	-	-	-	-	-
MC 310	-	-	-	-	-	-	-	-	-	-	-	-
MC 311	-	-	-	-	-	-	-	-	-	-	-	-
MC 312	-	-	-	-	-	-	-	-	-	-	-	-
MC 330	6	16	10,583	-	-	-	-	-	-	6	16	10,583
MC 331	544	5	10,460	130	4	10,612	-	-	-	414	6	10,412
Non-Specification Liquid Tanks	19	13	5,884	9	19	6,311	-	-	-	10	7	5,500
Total Vehicles	981	6	9,493	292	7	8,338	-	-	-	689	6	9,983

TABLE 14

Distribution of Vehicles by
ICC/DOT Spec. No. -- Data from Questionnaire
(Other)

ICC/DOT Specification Number	All Companies			API Members			NTTC Members			Others		
	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity	No. of Vehicles	Avg. Age	Avg. Capacity
MC 300	3	12	8,233	-	-	-	-	-	-	3	12	8,233
MC 301	-	-	-	-	-	-	-	-	-	-	-	-
MC 302	1	22	8,500	-	-	-	-	-	-	1	22	8,500
MC 303	141	14	5,096	-	-	-	140	13	5,103	1	38	4,074
MC 304	6	12	7,250	-	-	-	6	12	7,250	-	-	-
MC 305	10	15	7,790	-	-	-	8	13	8,025	2	21	6,850
MC 306	495	8	5,315	-	-	-	481	8	5,210	14	7	8,939
MC 307	434	4	5,224	1	1	8,500	429	4	5,217	4	7	5,050
MC 310	1	15	3,600	-	-	-	-	-	-	1	15	3,600
MC 311	1	20	4,500	-	-	-	-	-	-	1	20	4,500
MC 312	10	5	4,610	-	-	-	-	-	-	10	5	4,610
MC 330	5	17	6,100	4	16	5,500	-	-	-	1	21	8,500
MC 331	25	7	7,668	21	7	8,100	-	-	-	4	4	5,400
Non-Specification Liquid Tanks	14	11	5,596	-	-	-	-	-	-	14	11	5,596
Total Vehicles	1,146	8	5,346	26	8	7,715	1,064	7	5,232	56	9	6,410

TABLE 15

Location of Tank Vehicles
by PAD -- Data from Questionnaire

	All Companies	Private Carriers	Jobber/ Commission Agent	Cooperative	For-Hire Common Carrier	Other
PAD I -- Total	11,726	3,855	102	18	7,432	319
Maine	70	30	6	-	34	-
New Hampshire	58	4	3	-	51	-
Vermont	13	13	-	-	-	-
Massachusetts	231	222	1	-	6	2
Connecticut	305	184	-	-	120	1
Rhode Island	73	73	-	-	-	-
New York	1,410	653	8	-	743	6
Pennsylvania	2,400	680	50	-	1,664	6
New Jersey	1,996	823	3	-	1,002	168
Maryland	456	192	4	11	235	14
District of Columbia	19	18	-	-	1	-
Delaware	159	146	2	1	10	-
West Virginia	778	114	-	-	664	-
Virginia	604	135	1	6	460	2
North Carolina	913	104	17	-	792	-
South Carolina	628	55	4	-	558	11

TABLE 15 (continued)

	All Companies	Private Carriers	Jobber/ Commission Agent	Cooperative	For-Hire Common Carrier	Other
Georgia	660	143	-	-	517	-
Florida	953	266	3	-	575	109
PAD II -- Total	12,137	3,201	337	492	8,107	-
North Dakota	182	15	-	56	111	-
South Dakota	189	33	-	22	134	-
Nebraska	432	126	-	8	298	-
Kansas	882	264	-	-	618	-
Oklahoma	373	84	24	-	265	-
Minnesota	452	92	19	190	151	-
Iowa	892	373	-	115	404	-
Missouri	616	142	-	11	463	-
Wisconsin	722	107	107	19	489	-
Illinois	2,116	651	87	-	1,378	-
Michigan	599	163	23	25	388	-
Indiana	890	233	2	-	655	-
Ohio	1,961	430	75	46	1,410	-
Kentucky	896	217	-	-	679	-
Tennessee	935	271	-	-	664	-

TABLE 15 (continued)

	All Companies	Private Carriers	Jobber/ Commission Agent	Cooperative	For-Hire Common Carrier	Other
PAD III -- Total	5,016	1,204	-	-	3,743	69
New Mexico	196	83	-	-	113	-
Texas	2,764	669	-	-	2,043	52
Arkansas	85	38	-	-	40	7
Louisiana	868	228	-	-	630	10
Mississippi	442	49	-	-	393	-
Alabama	661	137	-	-	524	-
PAD IV -- Total	1,022	254	-	54	714	-
Montana	189	24	-	54	111	-
Idaho	44	12	-	-	32	-
Wyoming	183	21	-	-	162	-
Utah	312	44	-	-	268	-
Colorado	294	153	-	-	141	-
PAD V -- Total	2,543	1,650	41	75	751	26
Washington	602	221	24	75	266	16
Oregon	467	175	15	-	277	-
Nevada	47	30	2	-	15	-
California	1,094	986	-	-	102	6
Arizona	249	158	-	-	91	-

TABLE 15 (continued)

	All Companies	Private Carriers	Jobber/ Commission Agent	Cooperative	For-Hire Common Carrier	Other
Hawaii	48	48	-	-	-	-
Alaska	36	32	-	-	-	4
Unallocated*	2,723	344	-	334	1,395	650
Did Not Report†	3,689	919	569	8	2,106	87
Grand Total	38,856	11,427	1,049	981	24,248	1,151

*Vehicles which are not domiciled in a particular state, according to the reporting companies.
†Some reporting companies did not report vehicle locations.

TABLE 16

Summary of Reported Data from Postcard Follow-Up

		NOJC	NCFC	CMA	Total
1.	Number of Companies Reporting Data	594	5	14	613
2.	Number of Tank Vehicles Owned	2,708	218	196	3,122
3.	Number of Tank Vehicles Leased	149	223	74	446
4.	Total Tank Vehicles Owned or Leased	2,857	441	270	3,568
5.	Number on Order (December 31, 1978)	130	30	2	162
6.	Average Age of Tank Vehicles	7.6	5.5	9.3	7.5
7.	Average Capacity	6,267	9,438	6,418	6,676
8.	Number of Power Units Owned/Leased	1,682	353	302	2,337

TABLE 17

Analysis of Responding Companies Not Reporting Data -- from Postcard Follow-Up

Reason For Not Reporting Data	NOJC	NCFC	CMA	Unidentifiable*	Total
Company Has No Tank Vehicles with 3,500 Gallons in Capacity or Greater	1,175	4	7	22	1,208
Company Does Not Own or Lease Tank Vehicles	91	38	24	3	156
Company No Longer in Business or Has Been Sold	131	0	0	2	133
Have Already Responded to Questionnaire	16	5	2	3	26
Do Not Have Time to Respond	30	0	1	0	31
Other	8	0	2	1	11
Total	1,451	47	36	31	1,565

*Respondent unidentifiable.

TABLE 18

Location of Tank Vehicles by PAD -- Data from Postcard Follow-UP

	All Companies	CMA	NOJC	NCFC
PAD I -- Total	2,517	83	2,386	48
Maine	67	-	67	-
New Hampshire	25	-	25	-
Vermont	24	-	24	-
Massachusetts	188	-	182	6
Connecticut	95	1	94	-
Rhode Island	2	-	2	-
New York	694	-	682	12
Pennsylvania	439	49	360	30
New Jersey	341	12	329	-
Maryland	30	-	30	-
District of Columbia	28	-	28	-
Delaware	36	10	26	-
West Virginia	3	3	-	-
Virginia	188	-	188	-
North Carolina	192	5	187	-

TABLE 18 (continued)

	All Companies	CMA	NOJC	NCFC
South Carolina	66	3	63	-
Georgia	6	-	6	-
Florida	93	-	93	-
PAD II -- Total	714	67	385	262
North Dakota	61	-	2	59
South Dakota	24	-	1	23
Nebraska	-	-	-	-
Kansas	-	-	-	-
Oklahoma	-	-	-	-
Minnesota	126	-	49	77
Iowa	4	2	2	-
Missouri	21	2	19	-
Wisconsin	75	-	75	-
Illinois	24	1	23	-
Michigan	120	3	117	-
Indiana	126	7	16	103
Ohio	80	5	75	-
Kentucky	38	34	4	-

TABLE 18 (continued)

	All Companies	CMA	NOJC	NCFC
Tennessee	15	13	2	-
PAD III -- Total	145	120	10	15
New Mexico	-	-	-	-
Texas	51	51	-	-
Arkansas	10	-	-	14
Louisiana	76	62	9	1
Mississippi	1	-	1	-
Alabama	7	7	-	-
PAD IV -- Total	54	-	9	45
Montana	49	-	4	45
Idaho	5	-	5	-
Wyoming	-	-	-	-
Utah	-	-	-	-
Colorado	-	-	-	-
PAD V -- Total	138	-	67	71
Washington	103	-	32	71

TABLE 18 (continued)

	All Companies	CMA	NOJC	NCFC
Oregon	35	-	35	-
Nevada	-	-	-	-
California	-	-	-	-
Arizona	-	-	-	-
Hawaii	-	-	-	-
Alaska	-	-	-	-
Unallocated	-	-	-	-
Did Not Report	-	-	-	-
Grand Total	3,568	270	2,857	441

TABLE 19

Combined Data from Questionnaire and Postcard Follow-Up

	All Companies	Private Carriers	Jobber/ Commission Agent	Cooperative	For-Hire Common Carrier	Other
Number of Tank Vehicles Owned	37,360	10,503	3,691	504	21,535	1,127
Number of Tank Vehicles Leased	5,064	1,194	215	918	2,713	24
Total Tank Vehicles Owned or Leased	42,424	11,697	3,906	1,422	24,248	1,151
Number on Order (Dec. 31, 1978)	1,797	361	189	64	1,178	5
Average Age of Tank Vehicles	7.4	6.2	7.7	6.1	8.0	7.6
Average Capacity	7,295	7,384	6,493	9,476	7,350	5,346
Number of Power Units Owned/Leased	38,308	11,465	2,605	2,436	21,681	121

TABLE 20

Location of Vehicles by PAD -- Data from Questionnaire and Postcard Follow-Up

	All Companies	Private Carriers	Jobber/ Commission Agent	Cooperative	For-Hire Common Carrier	Other
PAD I -- Total	14,243	3,938	2,488	66	7,432	319
Maine	137	30	73	-	34	-
New Hampshire	83	4	28	-	51	-
Vermont	37	13	24	-	-	-
Massachusetts	419	222	183	6	6	2
Connecticut	400	185	94	-	120	1
Rhode Island	75	73	2	-	-	-
New York	2,104	653	690	12	743	6
Pennsylvania	2,839	729	410	30	1,664	6
New Jersey	2,337	835	332	-	1,002	168
Maryland	486	192	34	11	235	14
District of Columbia	47	18	28	-	1	-
Delaware	195	156	28	1	10	-
West Virginia	781	117	-	-	664	-
Virginia	792	135	189	6	460	2
North Carolina	1,105	109	204	-	792	-
South Carolina	694	58	67	-	558	11

TABLE 20 (continued)

	All Companies	Private Carriers	Jobber/ Commission Agent	Cooperative	For-Hire Common Carrier	Other
Georgia	666	143	6	-	517	-
Florida	1,046	266	96	-	575	109
PAD II -- Total	12,851	3,268	722	754	8,107	-
North Dakota	243	15	2	115	111	-
South Dakota	213	33	1	45	134	-
Nebraska	432	126	-	8	298	-
Kansas	882	264	-	-	618	-
Oklahoma	373	84	24	-	265	-
Minnesota	578	92	68	267	151	-
Iowa	896	375	2	115	404	-
Missouri	637	144	19	11	463	-
Wisconsin	797	107	182	19	489	-
Illinois	2,140	652	110	-	1,378	-
Michigan	719	166	140	25	388	-
Indiana	1,016	240	18	103	655	-
Ohio	2,041	435	150	46	1,410	-
Kentucky	934	251	4	-	679	-
Tennessee	950	284	2	-	664	-

TABLE 20 (continued)

	All Companies	Private Carriers	Jobber/ Commission Agent	Cooperative	For-Hire Common Carrier	Other
PAD III -- Total	5,161	1,324	10	15	3,743	69
New Mexico	196	83	-	-	113	-
Texas	2,815	720	-	-	2,043	52
Arkansas	95	38	9	1	40	7
Louisiana	944	290	-	14	630	10
Mississippi	443	49	1	-	393	-
Alabama	668	144	-	-	524	-
PAD IV -- Total	1,076	254	9	99	714	-
Montana	238	24	4	99	111	-
Idaho	49	12	5	-	32	-
Wyoming	183	21	-	-	162	-
Utah	312	44	-	-	268	-
Colorado	294	153	-	-	141	-
PAD V -- Total	2,681	1,650	108	146	751	26
Washington	705	221	56	146	266	16
Oregon	502	175	50	-	277	-
Nevada	47	30	2	-	15	-
California	1,094	986	-	-	102	6

TABLE 20 (continued)

	All Companies	Private Carriers	Jobber/ Commission Agent	Cooperative	For-Hire Common Carrier	Other
Arizona	249	158	-	-	91	-
Hawaii	48	48	-	-	-	-
Alaska	36	32	-	-	-	4
Unallocated*	2,723	344	-	334	1,395	650
Did Not Report†	3,689	919	569	8	2,106	87
Grand Total	42,424	11,697§	3,906¶	1,422**	24,248	1,151

*Vehicles which are not domiciled in a particular state, according to the reporting companies.
†Some reporting companies did not report vehicle locations.
§Includes CMA vehicles from postcard follow-up survey.
¶Includes NOJC vehicles from postcard follow-up survey.
**Includes NCFC vehicles from postcard follow-up survey.

NOJC Follow-Up Survey

At the request of the Tank Cars/Trucks Task Group, a telephone survey was made of 61 of the 3,195 companies (about one in fifty) that did not respond to the postcard follow-up survey. The companies included in the telephone survey were not selected by scientific sampling procedures.

The purpose of the survey was to obtain information about the non-respondent NOJC companies, such as what percentage of these companies own tank vehicles 3,500 gallons in capacity or greater, and the average number of such vehicles owned by these companies.

The results of the telephone survey are presented in the following tables. Where possible, the telephone survey results are compared with the postcard follow-up results, to assist the reader in interpreting the data.

TABLE 21

NOJC Follow-Up Survey -- Comparison of Respondents to Postcard and Telephone Follow-Up Surveys

	Postcard		Telephone	
	No.	%	No.	%
1. Companies Responding to Survey	2,045	--	61	--
2. Companies with Tank Vehicles Under 3,500 Gallon Capacity Only	1,175	57	31	51
3. Companies with Tank Vehicles 3,500 Gallon Capacity or Greater Only	594	29	5	8
4. Companies with Tank Vehicles Both Under 3,500 Gallon Capacity and 3,500 Gallon Capacity or Greater			14	23
5. Company Does Not Own or Lease Tank Vehicles	91	4	5	8
6. Company No Longer in Business/Sold	131	6	6	10
7. Have Already Responded to Questionnaire	16	1	0	--
8. No Time to Respond	30	1	0	--
9. Other	8	1	0	--

TABLE 22

NOJC Follow-Up Survey -- Comparison of Date Reported in Response to Postcard and Telephone Follow-Up Surveys

	Postcard	Telephone
1. Companies Which Own and/or Lease Tank Vehicles 3,500 Gallon Capacity or Under Only	*	
● No. of Vehicles per Company		
- Average		4.4
- Median		3.0
● Average Capacity in Gallons		2,379
● Average Age in Years		5.8
2. Companies Which Own and/or Lease Tank Vehicles 3,500 Gallon Capacity or Greater Only	*	
● No. of Vehicles per Company		
- Average		10.2
- Median		2.0
● Average Capacity in Gallons		3,996
● Average Age in Years		5.5

TABLE 22 (continued)

	Postcard	Telephone
3. Companies Which Own and/or Lease Tank Vehicles Both Under and Over 3,500 Gallon Capacity		
Vehicles Under 3,500 Gallon Capacity	*	
• No. of Vehicles per Company		
- Average		8.1
- Median		4.0
• Average Capacity in Gallons		2,300
• Average Age in Years		3.9
Vehicles Over 3,500 Gallon Capacity		
• No. of Vehicles per Company		
- Average	4.8	3.9
- Median	2.0	2.5
• Average Capacity in Gallons	6,267	7,047
• Average Age in Years	7.6	6.3

* Data not requested in postcard survey.

GLOSSARY

bulk carrier -- a carrier engaged in transporting commodities such as petroleum where the commodity is not packaged, canned, drummed, or otherwise packed.

carrier -- an individual, partnership, or corporation engaged in the business of transporting goods.

common carrier -- transportation line or system carrying persons or goods for compensation, impartially for all persons or shippers.

contract carrier -- any person, partnership, or corporation, not a common carrier, who, under individual contracts or agreements, transports passengers or property for compensation.

destination (unloading point) -- place to which a shipment is consigned or delivered.

dry bulk tanks -- designed for transporting cement, flour, etc., and could, with modification, transport liquid commodities.

general purpose type tanks -- tanks used conventionally for petroleum products and non-corrosive chemicals, etc.; can be top or bottom loading, top or bottom unloading; designed for moderate or no pressure.

interchange point -- location at which shipment, in course of transportation, is delivered by one railroad to another.

interstate traffic -- traffic moving from a point in one state to a point in another state; between points in the same state, but passing within or through another state enroute; and between points in the United States and foreign countries.

intrastate traffic -- traffic having origin, destination, and entire transportation within the same state.

loading point -- location at which shipment is received by a carrier; i.e., refinery terminal or bulk plant.

loading time -- the time required once the transporting equipment is spotted, inspected, loaded, and released to move. It varies from shipper to shipper, and is contingent on shipper facilities; i.e., congestion within facilities, age of facility and equipment etc.

local traffic -- traffic moving between points on same carrier.

LNG (liquified natural gas) -- natural gas becomes a liquid at a temperature of minus 258°F and may be stored and transported in the liquid state.

LPG (liquified petroleum gases) -- butane, propane, and ethane which are separated from natural and refinery gases by fractionation and are transported in liquid form.

MC specification -- 300, 301, 302, 303, 304, 305, 306, 307, 310, 311, 312, 330, and 331 designated DOT (formerly ICC) specifications. The particular hazard classification and product characteristics are indicative of the MC specification tank to be used.

non-specification tanks -- these tanks are utilized for the transportation of certain petroleum products and other products not considered hazardous, i.e., asphalt, certain road oil or sufacing materials, greases, and edible products.

One Percent Waybill Sample -- sample of origin points of car movements in the United States, which represent approximately one percent of all tank car movements. This sample is compiled by the ICC.

origin point -- the point at which shipment originates; i.e., loading point.

private carrier -- any person, partnership, or corporation other than common or contract carrier who transports property of which such party is the owner, and the transportation is in furtherance of its commercial enterprise.

refinery -- manufacturing plant where crude oil is converted into various petroleum products or petrochemicals.

route -- (a) course or direction a shipment moves; (b) designation of motor carrier or rail lines from point of origin to point of delivery.

semi-trailer -- a vehicle without motive power designed to be drawn or towed by another vehicle and so constructed that some part of its weight, and that of its load, rests upon, or is carried by, a towing vehicle.

tank car -- rail car used for transporting liquids in bulk. It is constructed in accordance with varying specifications, due to physical properties and characteristics of products to be transported.

tractor -- power vehicle designed primarily for drawing or towing other vehicles, but not constructed to carry a load other than part of the weight of the vehicle and load so drawn.

trailer -- vehicle (bulk tank) without motive power designed to be drawn by a tractor and so constructed that no part of its weight rests upon the towing vehicle. Also a second trailer; i.e., pup attached to first trailer with single tractor. There are varying specifications for physical properties and characteristics of products carried.

truck -- powered vehicle with bulk tank on same chassis (capacity in excess of 3,500 gallons). Possible varying specifications due to characteristics of products carried.

unloading time -- time required to unload bulk products at consignee's facility. This also can vary from consignee to consignee, contingent on facility and equipment available or required.